



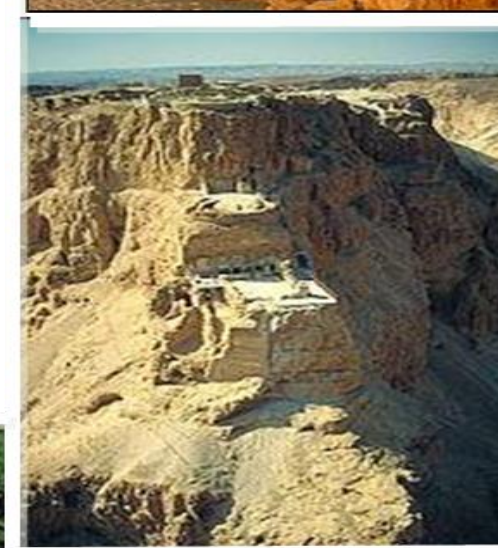
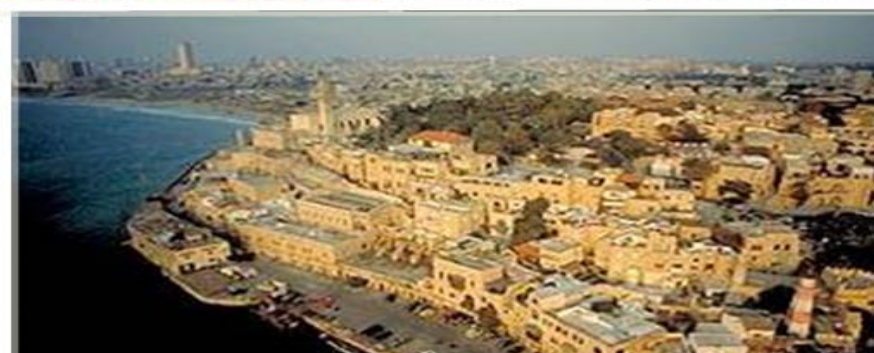
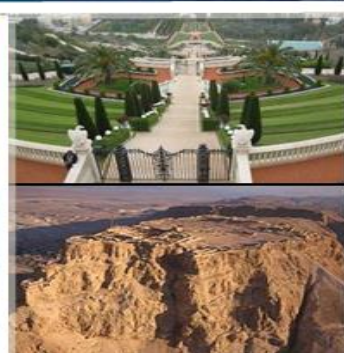
Smart Energy Network's Meeting

September 2019, Oslo

Elad Shaviv

CEO

The Israeli Smart Energy Association



Agenda

- **Israel: Innovation Based Economy**
- **The Israeli Energy Innovation Hub**
- **The Changing Global Energy Market**
- **Examples of Israeli Innovation in Energy**

Israel: Innovation Based Economy

**“If an expert says it can't be done,
get another expert”**

David Ben Gurion

Chat



ICQ

Internet Calls



Vocaltec

Disk on Key



M-Systems

Gastrointestinal Diagnosis



Given Imaging

Drip Irrigation



Netafim

Social Navigation



Waze

- #1 country with Nasdaq-listed companies except the U.S. and China
- #1 country in terms of VC Investment per Capita and as a % of GDP
- #1 country in terms of start-ups concentration: there's 1 start-up for every 400 people
- #1 start-up ecosystem after the US according to the 2015 Compass Global Start-up Ecosystem Ranking
- #1 country in terms of R&D employees concentration: 140 per 10,000
- #1 country in terms of high tech employee concentration: around 1 per 10 working people
- #1 in the production of scientific papers
- #1 out of 148 economies in innovation abilities, #2 in entrepreneurship and #3 in global innovation according to the 2016 IMD Competitiveness Yearbook
- #1 out of 60 leading economies around the world for technological and scientific abilities according to the annual Global Dynamism Index (GDI)

Source: Ragtime, The Investment Platform, January, 2018

Approximately 5,000 active startup companies in Israel



Multinational R&D & Innovation Centers in Israel

Industry/ Origin	IT, Hardware, Software & Services			Internet & Retail	Semiconductors	Finance, Banking & Insurance	Communications	Automotive, Energy, utility & Industrial		Healthcare & Medical		Other Industries	Electronics
North America													
Europe													
Asia													

The Israeli Energy Innovation Hub

A national, private, non-for-profit, industry association, bringing local and global players who share the interest in implementing and developing smart energy solutions to achieve economy growth through sustainable future.

■ Founded: 2011

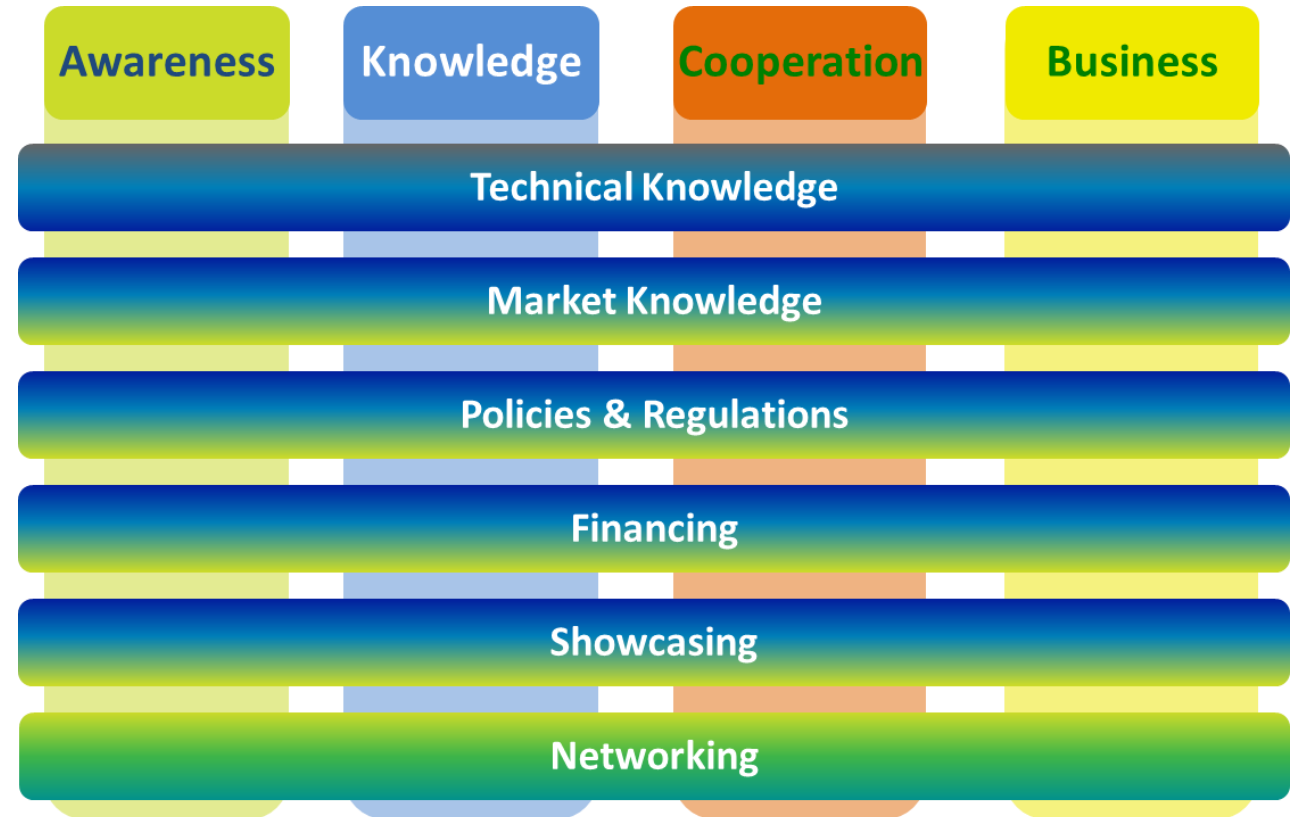
Founders: Amos Lasker, Chairman
Elad Shaviv, CEO

■ Community:

~1,500 people, 150 companies

■ Activity Partners:

- Israeli Electric Corp
- Ministry of Energy
- Ministry of Economy
- Ministry of Science
- Ben Gurion University
- IDC Herzeliya
- SNI (Technion)



www.isea.org.il

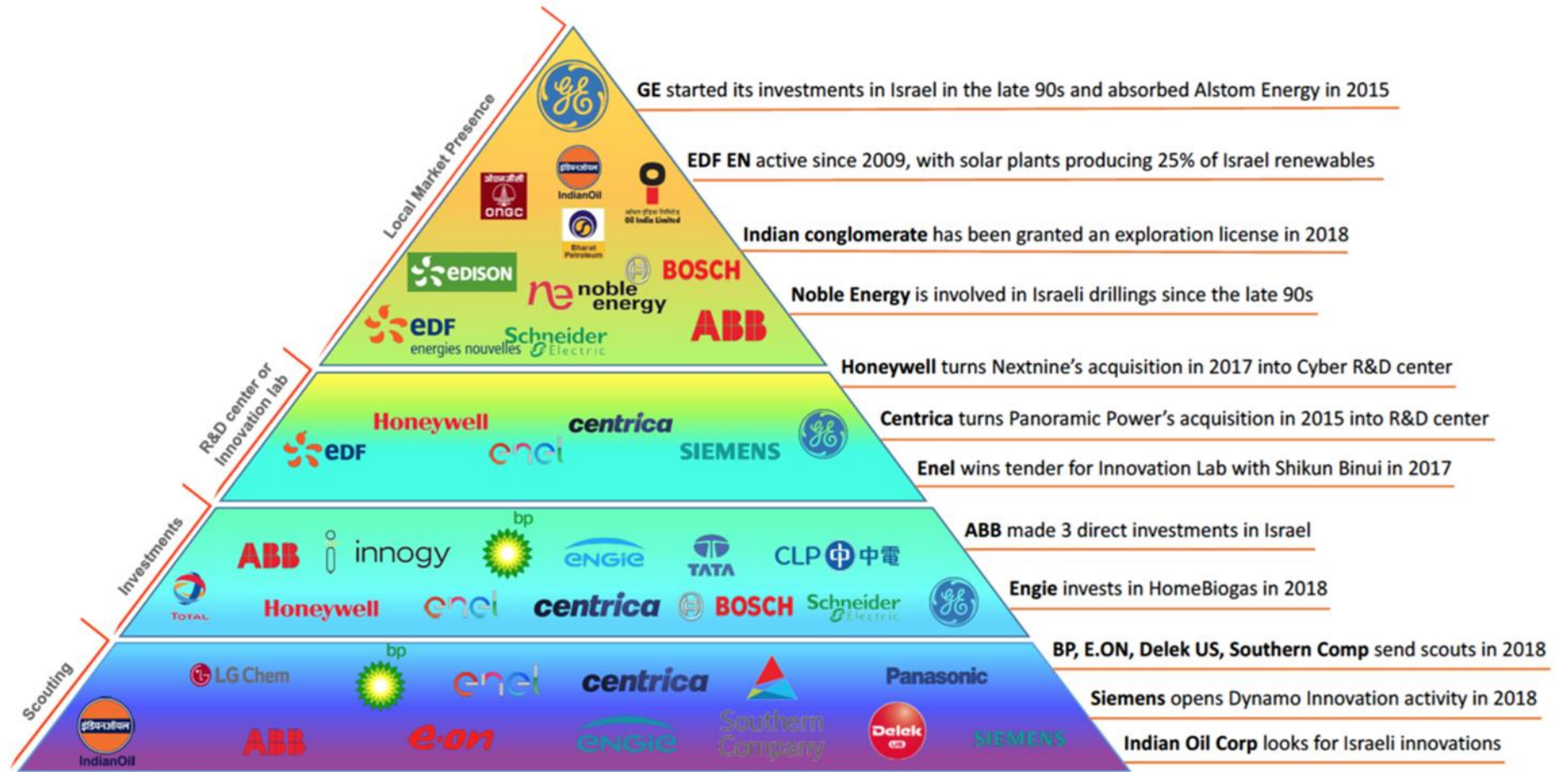
- ISEA's Israeli Smart Energy Conference (5 conferences)
- ISEA's Israeli Academic Smart Energy Conference
- ISEA's Power Utilities Business innovation Forum
- Tens of seminars & webinars
- Researches:
 - Roadmap for Smart Grid Deployment in Israel
 - Microgrid deployment implications for Israel
 - Clean Energy Innovation in Israel



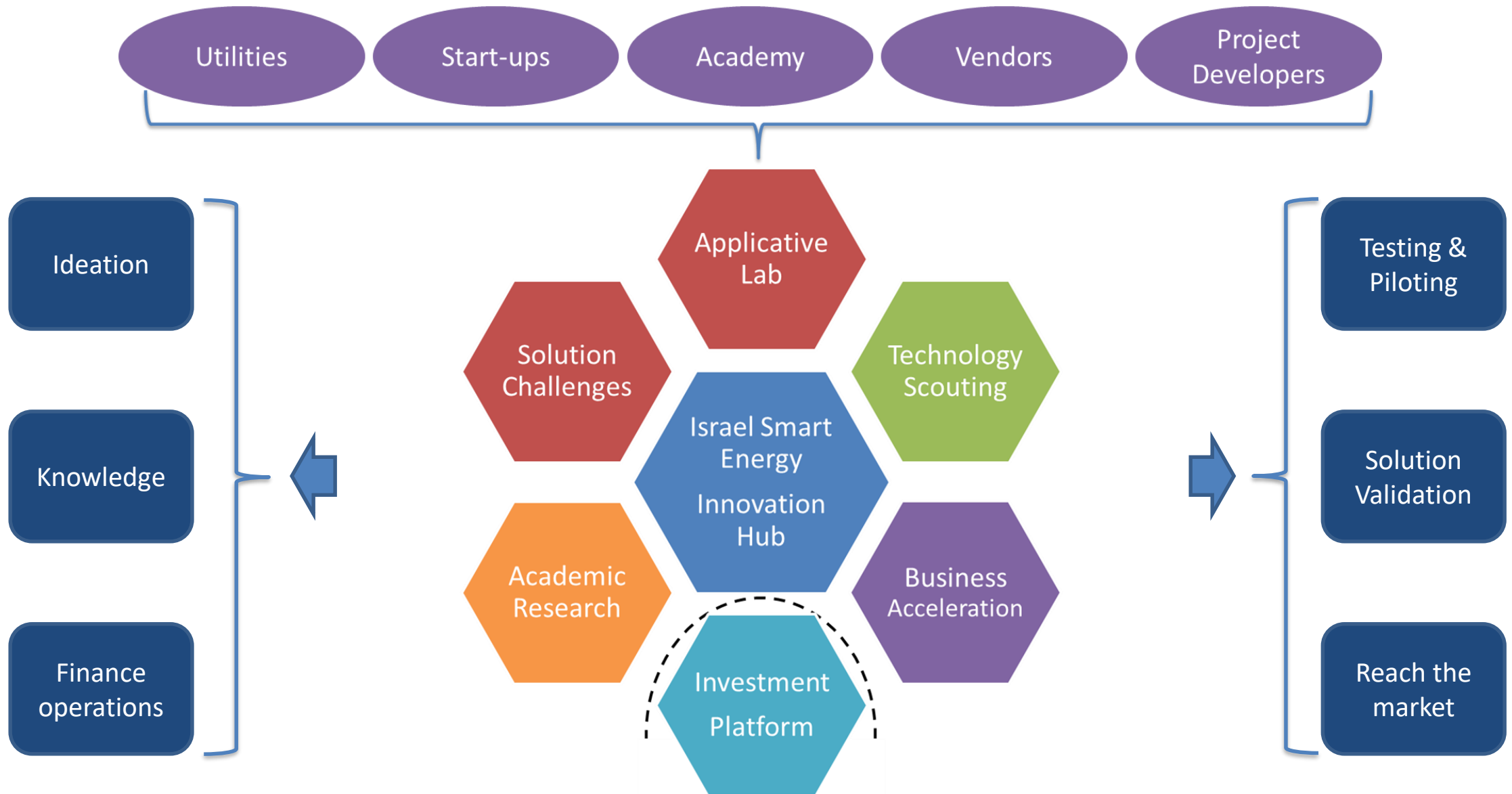
Energy Global Players Entering Israel

An Average of 20 New (foreign) R&D Centres are Established Every Year

Source: Israel Innovation Authority



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The Israel Energy Innovation hub goal is to match and support leading global utilities and vendors, with Israeli entrepreneurs and researchers to jointly capture new opportunities in the disrupted energy market.

Global Members

- Power utilities
- Competitive energy service providers
- Infrastructure engineering firms
- General energy conglomerates

Technologies

- End Users applications
- Cyber security
- Smart cities
- Blockchain & Energy trade
- Management & Analytics
- Internet of Things
- Buildings & energy
- Distributed Energy solutions
- Energy Storage
- Grid modernization
- Microgrids
- Electric Vehicles
- Communications
- Core Applications

Israel cooperation:

- Universities: Technion, Bar-Ilan University
- Ministries: Economy, Energy, Science
- The Innovation Authority

NYPA: New York Power Authority

- Technology Scouting
- \$2.5M Startup challenge competition

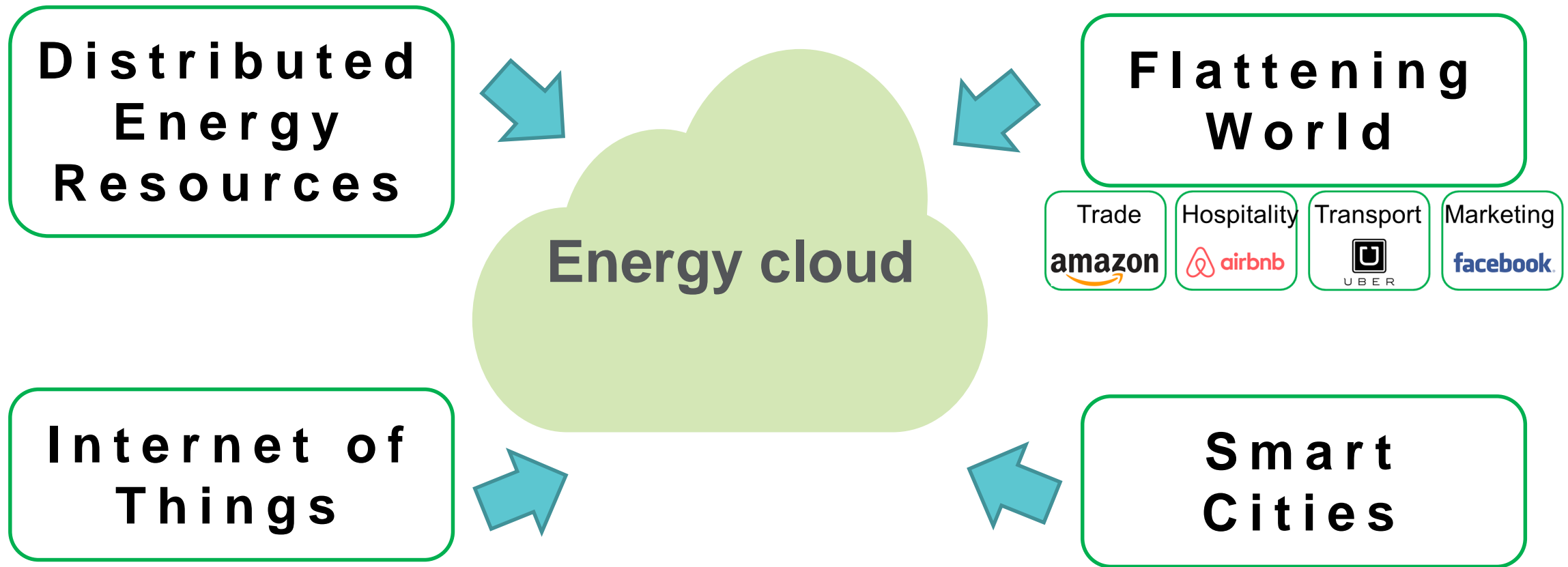
NREL: The US DoE Renewable Energy Laboratory

- Cooperate on expanding NREL's International Technology Incubation initiative to Israel
- Setting-up a mentorship program where NREL researches provides mentorship to Israeli entrepreneurs
- Provide initial review or analysis for assessment of new ventures
- Publish sponsored and un-sponsored call for research for the Hub's community
- Provide energy data dumps and other statistical information that can be used at the Hub's lab
- Host a sponsored yearly Hub event at NREL

The Changing Global Energy Market

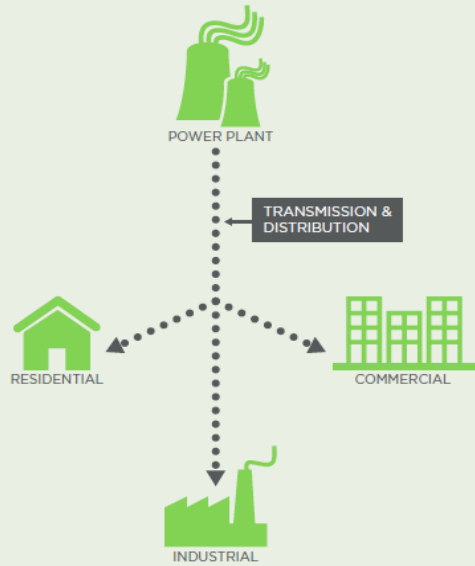
Technologies

Markets



Past

Traditional Power Grid



Central, One-Way Power System, focused on Safe, Reliable and Affordable power

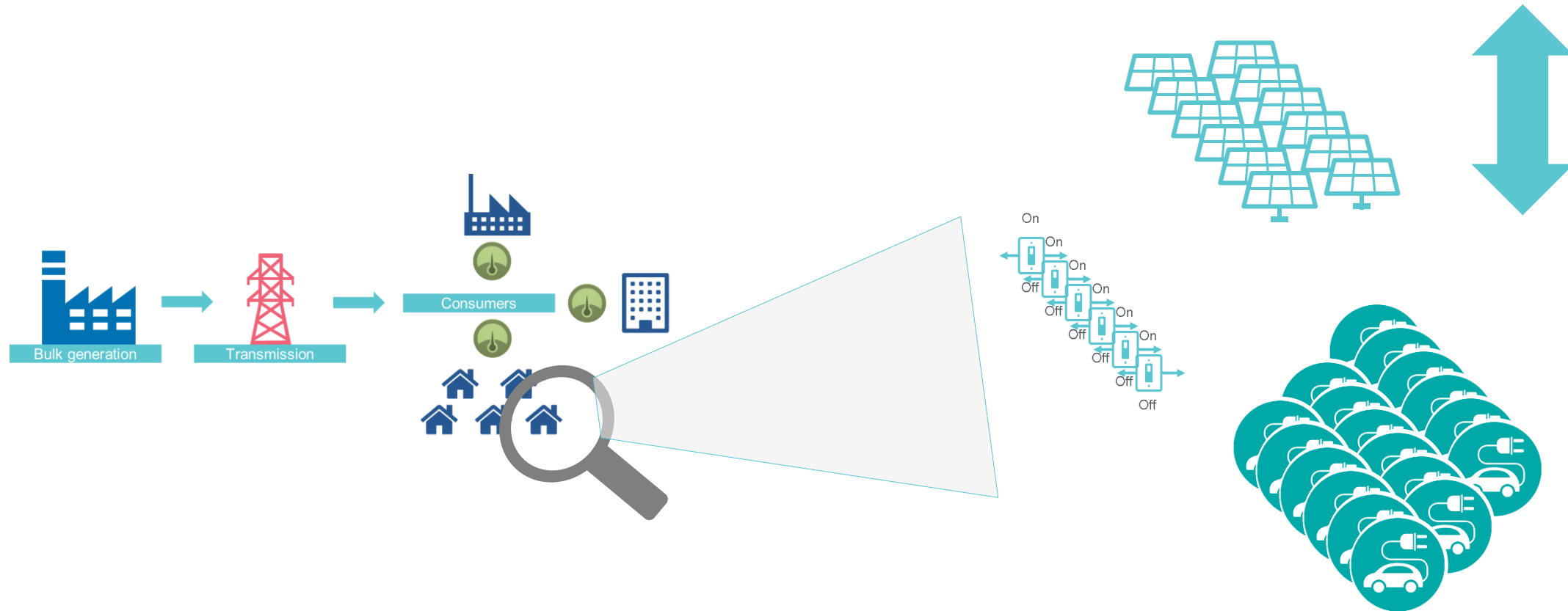


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Rooftop solar Electrical Vehicles

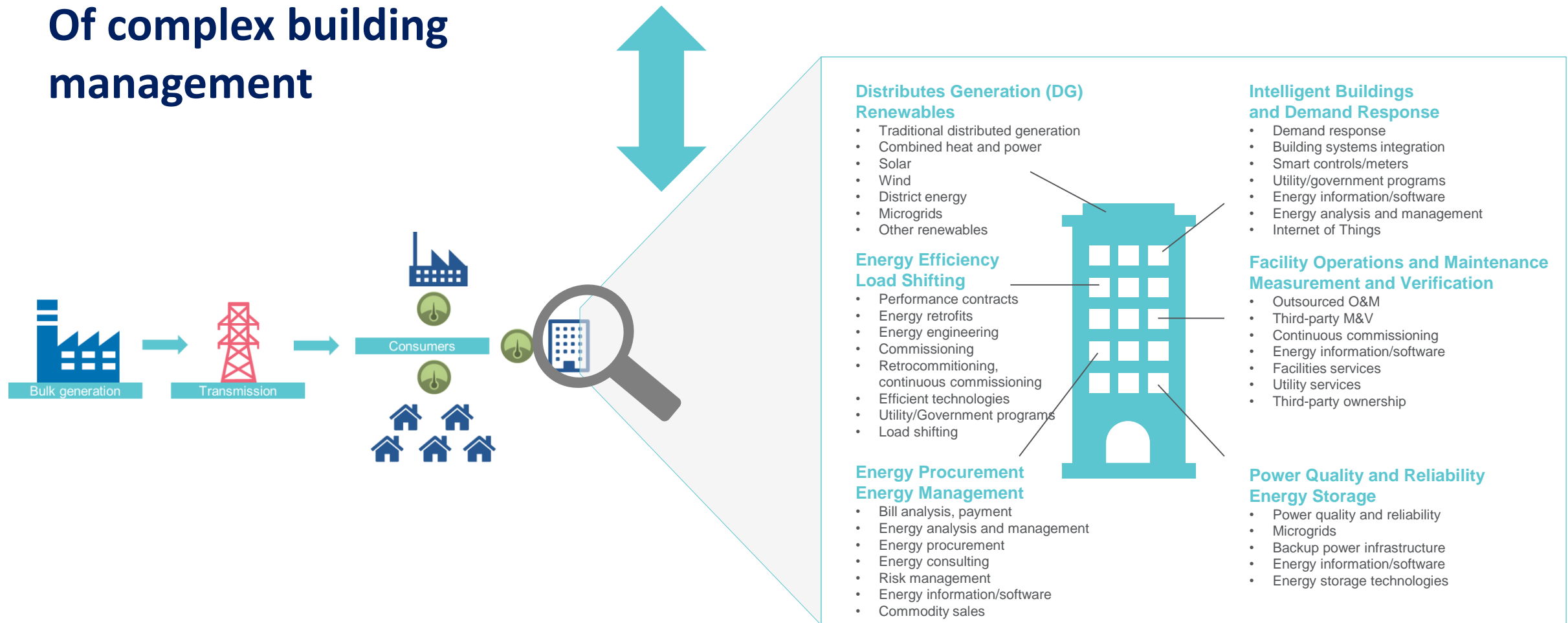
Virtual Power Plants Transportations Stakeholders



New playground at the Commercial Market

Energy as integral part Of complex building management

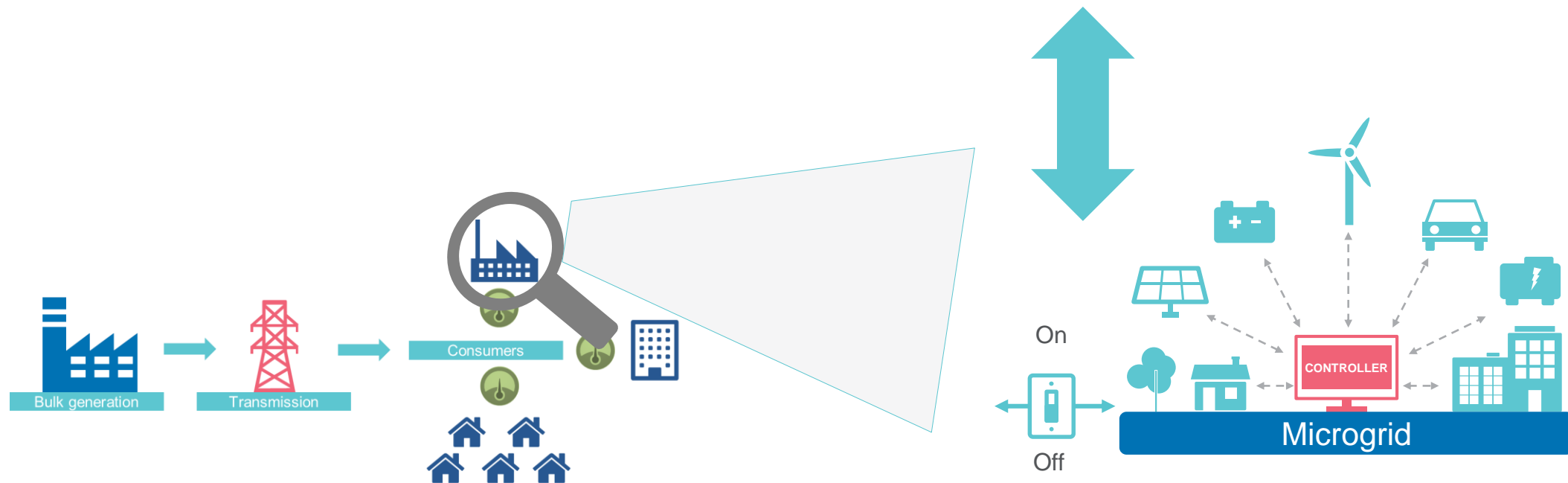
Real Estate Developers, Facility Operations



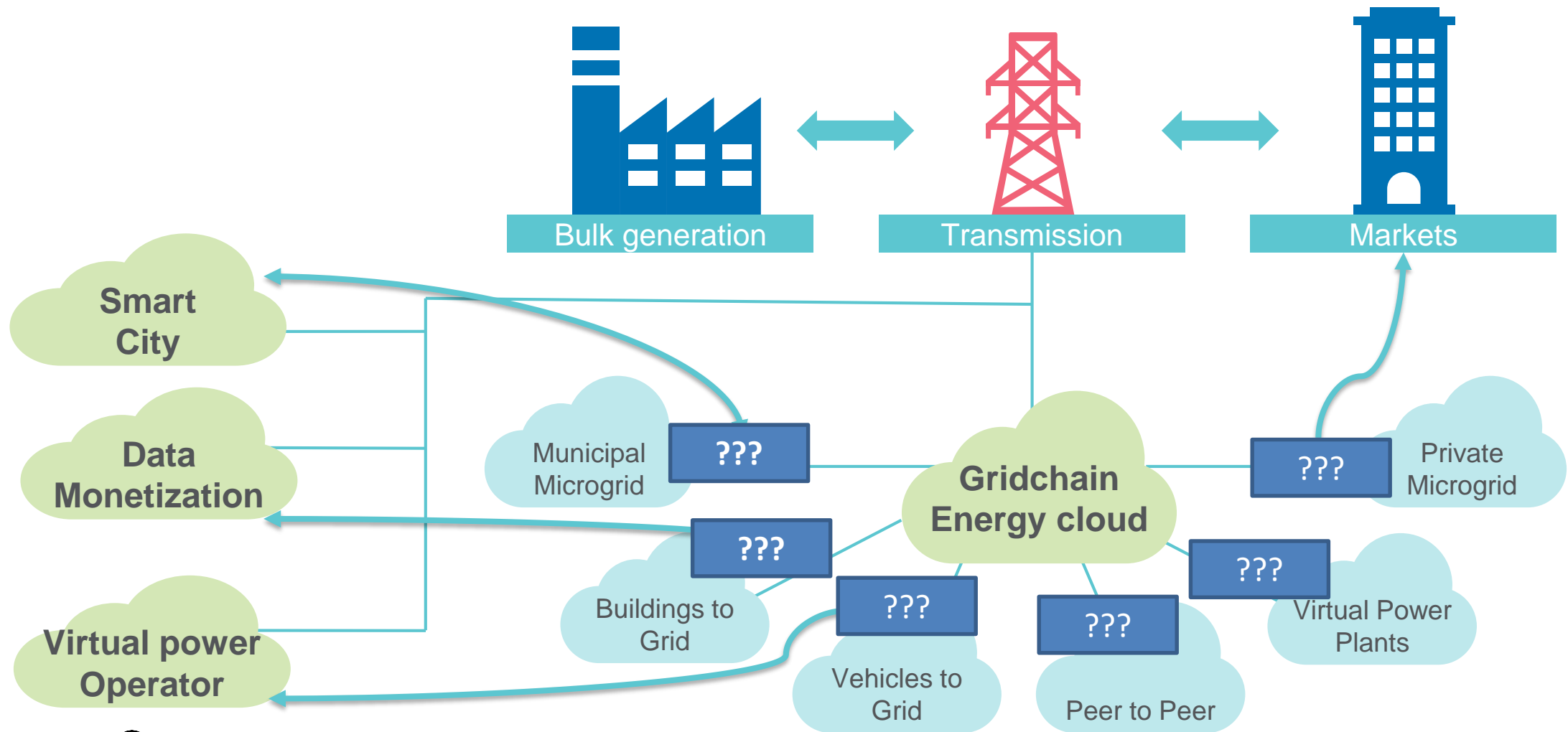
Source: FMI Corporation, The 2016 U.S. Markets Construction Overview

Grid tied Microgrids Smart campuses & cities

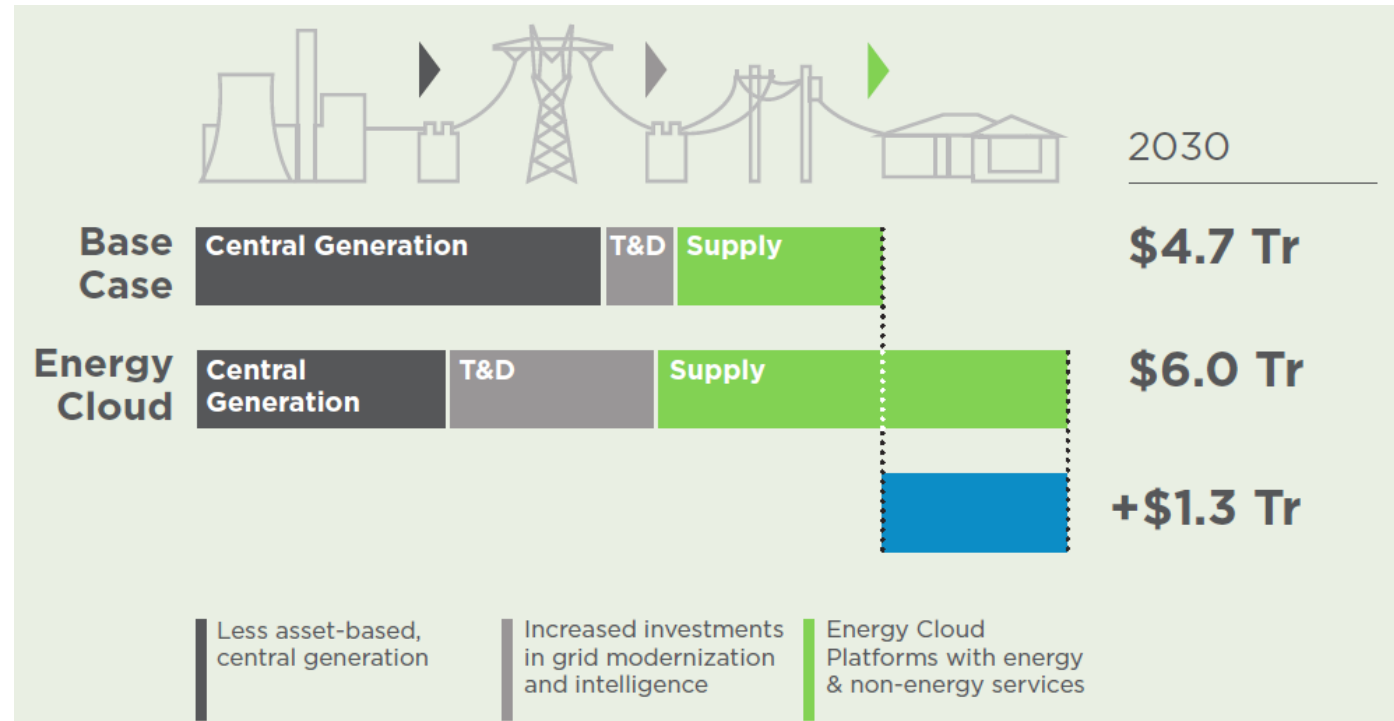
Municipalities, System integrators, Microgrid operators



NEW PLAYGROUND – Are You Ready?

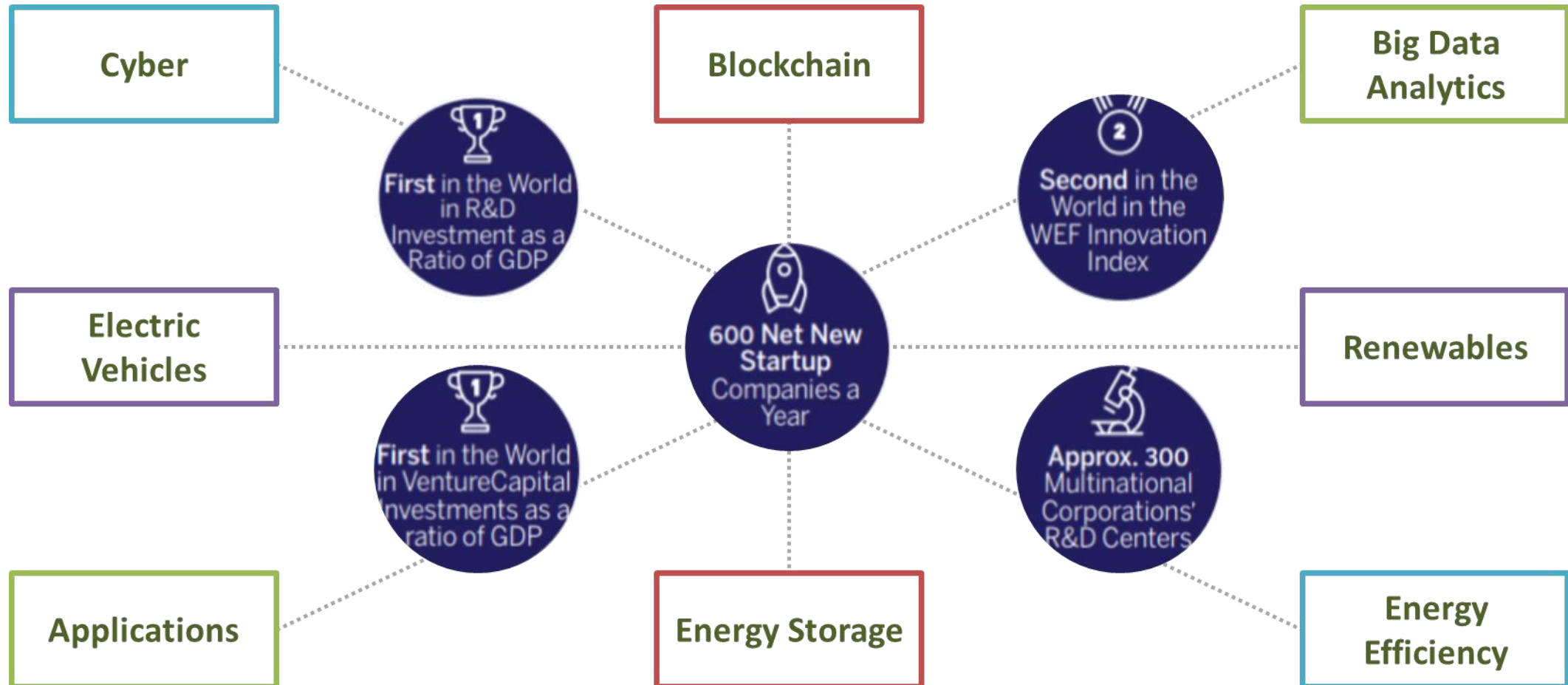


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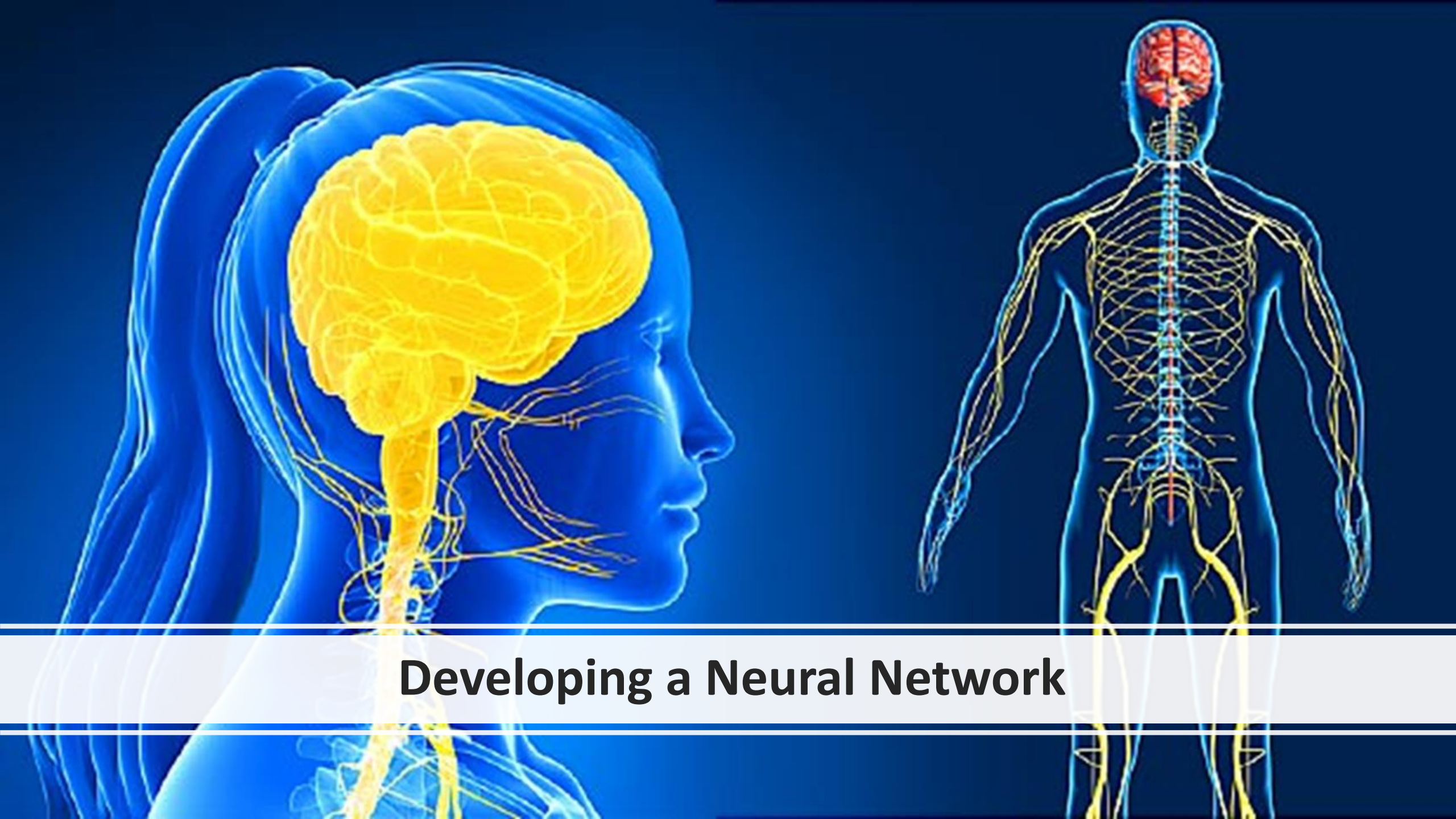


Disruptors are cash heavy, thriving in-house R&D engines, and often own customer relationship

Source: Navigant



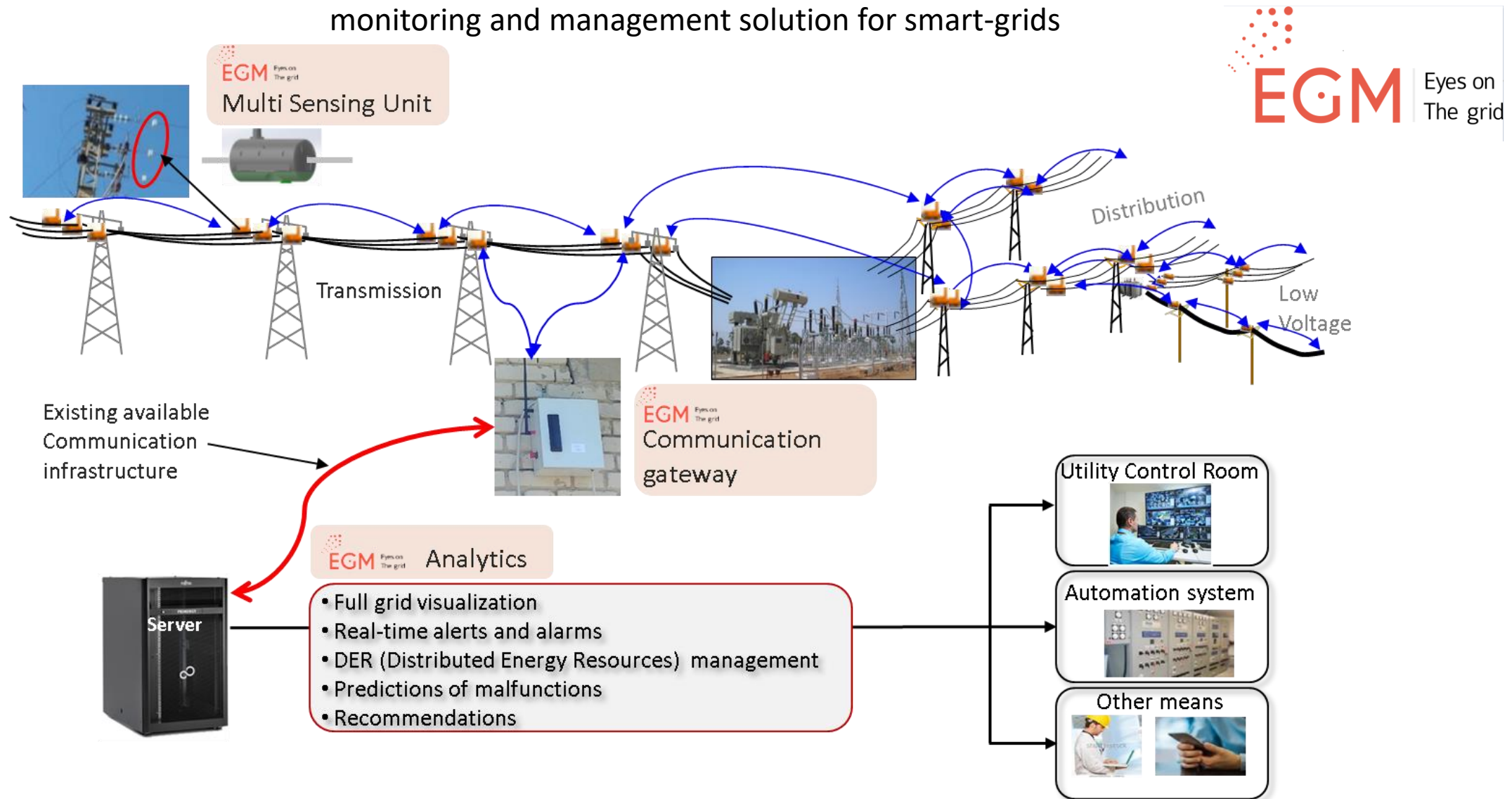
Examples Of Israeli Innovation in Energy



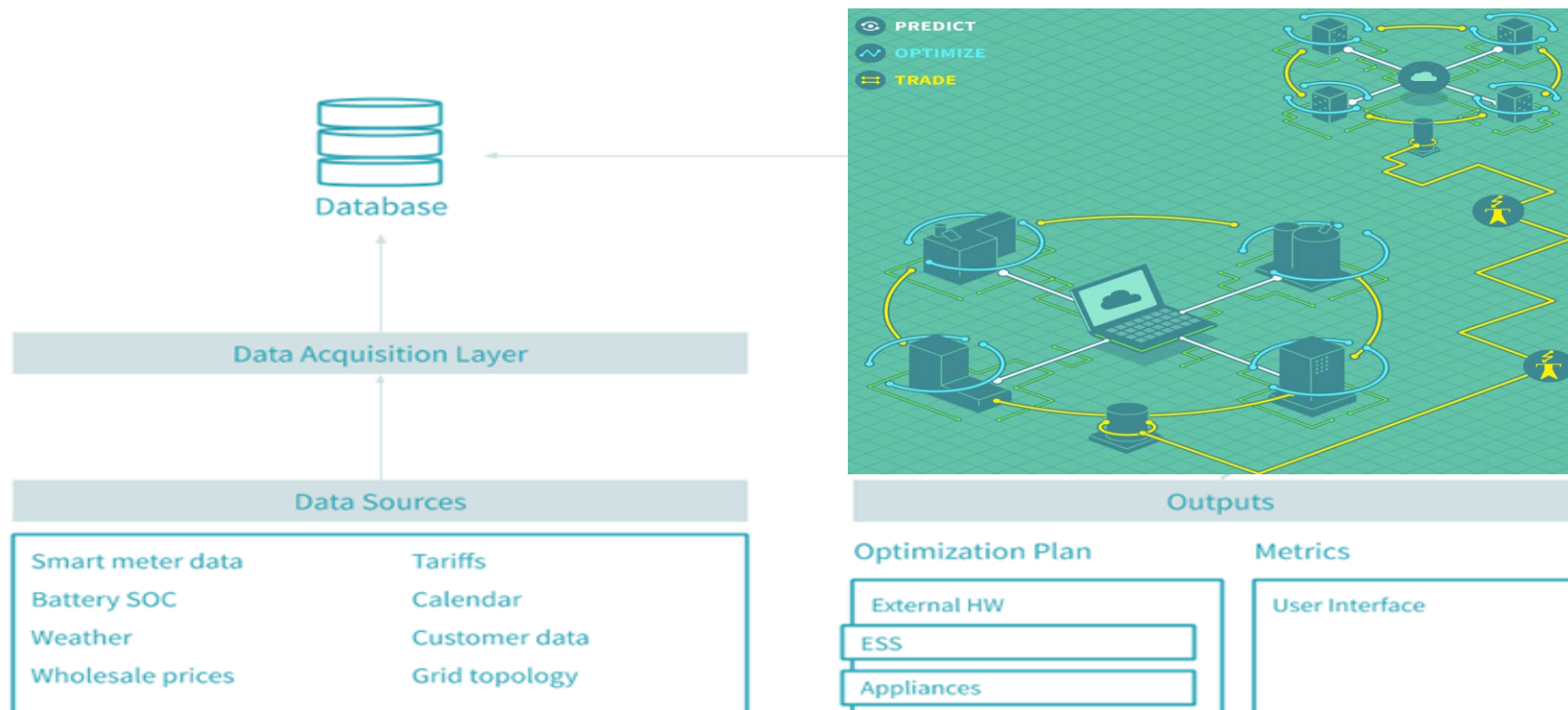
Developing a Neural Network

EGM: Converts static grids into a digitized & dynamic network

EGM solutions leverage cutting-edge IOT, Big-Data & Artificial Intelligence technologies to provide advanced electrical grid monitoring and management solution for smart-grids



FSIGHT: Platform For Distributed Grid Management



Technology – Machine learning forecasting, heuristic based optimization and peer to peer trading.

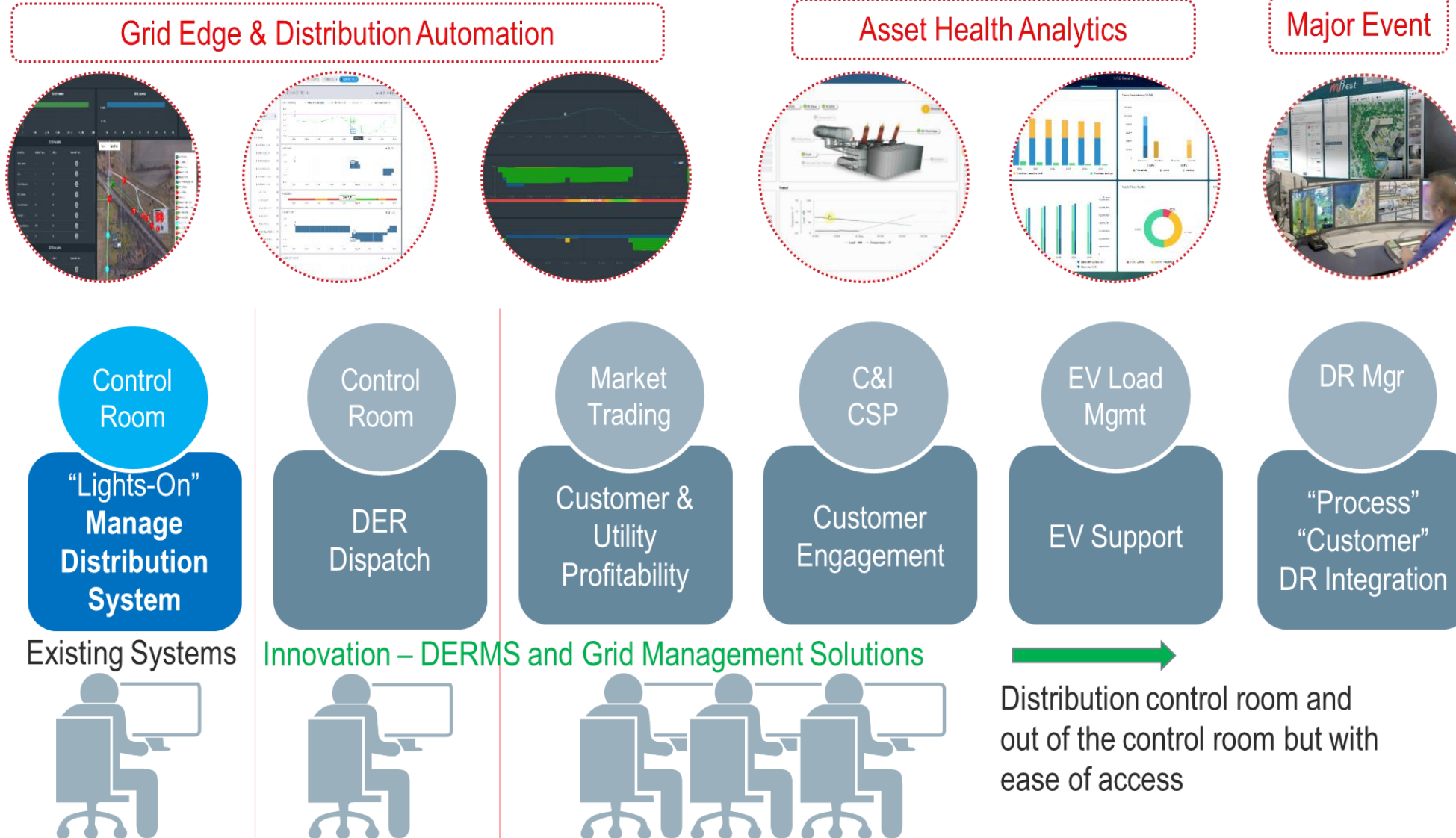
Distributed market engine - Creates autonomous local energy markets by predicting local supply & demand.

Fog architecture - Enables self organization of DER assets & communities to create resilient, scalable and efficient micro grids.

Field proven - With over 200 prosumers in dozens of commercial projects as well as the advanced distributed grid

Saves money - Reduces energy costs, generates new revenue streams and increases renewable energy utilization.

Mprest: Defence Technology Converted to Support Energy Applications



mPrest

SolarEdge Technologies – Starting Point

Provider of power optimizer, solar inverter and monitoring products for photovoltaic arrays.

Traditional String Inverters



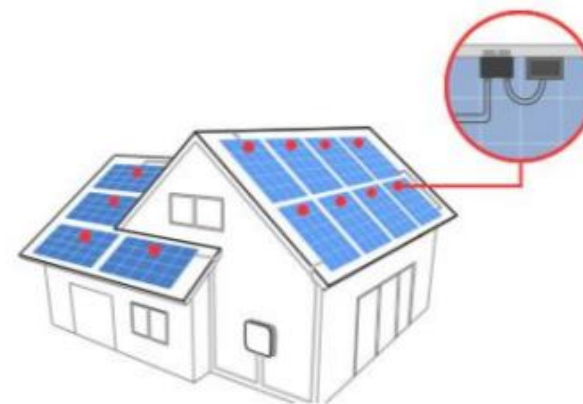
- One central inverter
- No module-level optimization
- No module-level intelligence
- ✗ Energy loss
- ✗ Limited roof utilization
- ✗ No module-level monitoring
- ✗ Safety hazards

Microinverters



- One inverter per module
- Module-level optimization
- Limited scalability
- ✗ Cost and scalability
- ✗ Questionable reliability
- ✗ Monitoring requires additional hardware

DC Optimized Inverter System



- Simplified central inverter
- Module-level optimization
- Improved scalability

solar**edge**

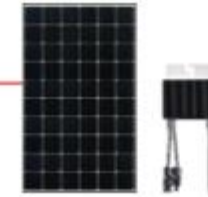
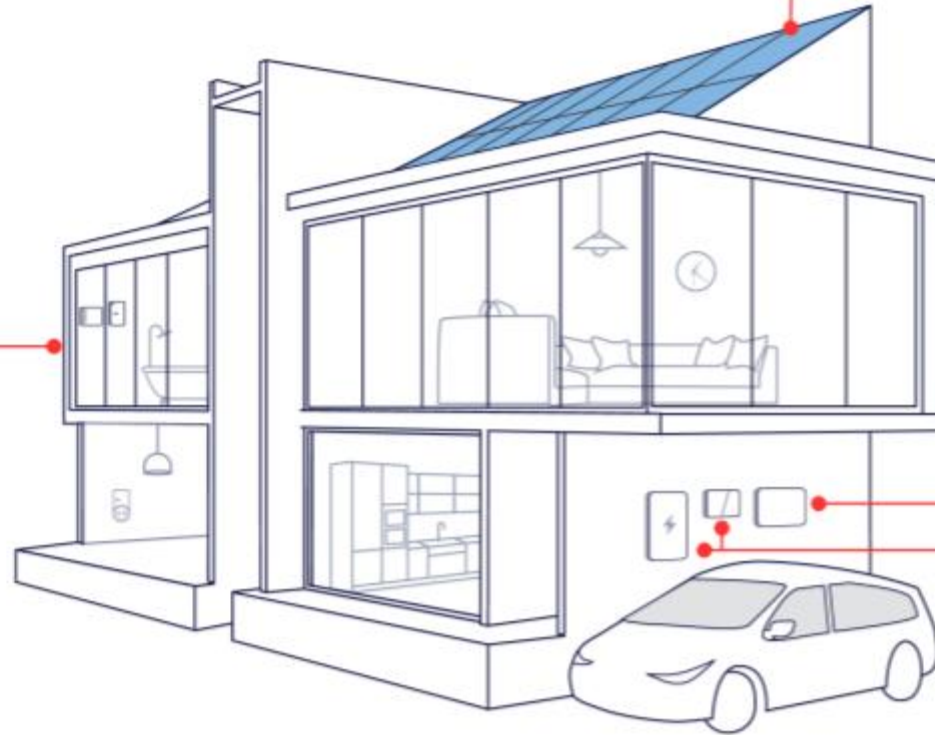
■ A single solution for PV, storage, smart energy, and EV charging



Smart Energy Products



Monitoring Platform



Smart Modules with
Pre-assembled Power
Optimizers



Inverters



StorEdge

13.1GW

of our systems
shipped
worldwide



40.8M

power optimizers
shipped



Over **1,100,000** monitored
systems around the world



1.7M

inverters shipped



Presence
in **28**
countries



2,078 employees



303 awarded patents and **240** additional
patent applications



World PV Inverter Supplier
Quarterly Rankings (\$ Revenues)

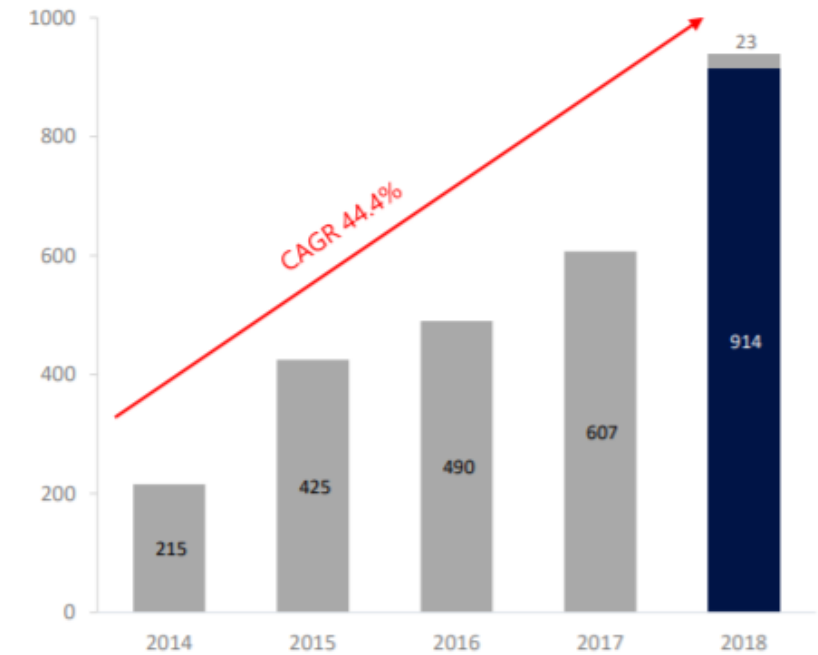
RANK	COMPANY
①	SolarEdge
2	SMA
3	Huawei
4	Sungrow
5	Power Electronics
6	Fronius
7	Delta
8	Enphase Energy
9	ABB
10	Omron

Source: IHS PV Inverter Market tracker Q2, 2019

World Single Phase PV Inverter Supplier
Share Estimates (MW Shipments)

RANK	COMPANY
①	SolarEdge
2	SMA
3	Growatt
4	Omron
5	Enphase Energy
6	Ginlong
7	Goodwe
8	Fronius
9	Panasonic
10	Delta

Source: IHS PV Inverter Market tracker Q2, 2019





Join ISEA & SEN Partnership Gain From The Energy Innovation Hub

Thank You
elad@isea.org.il
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