

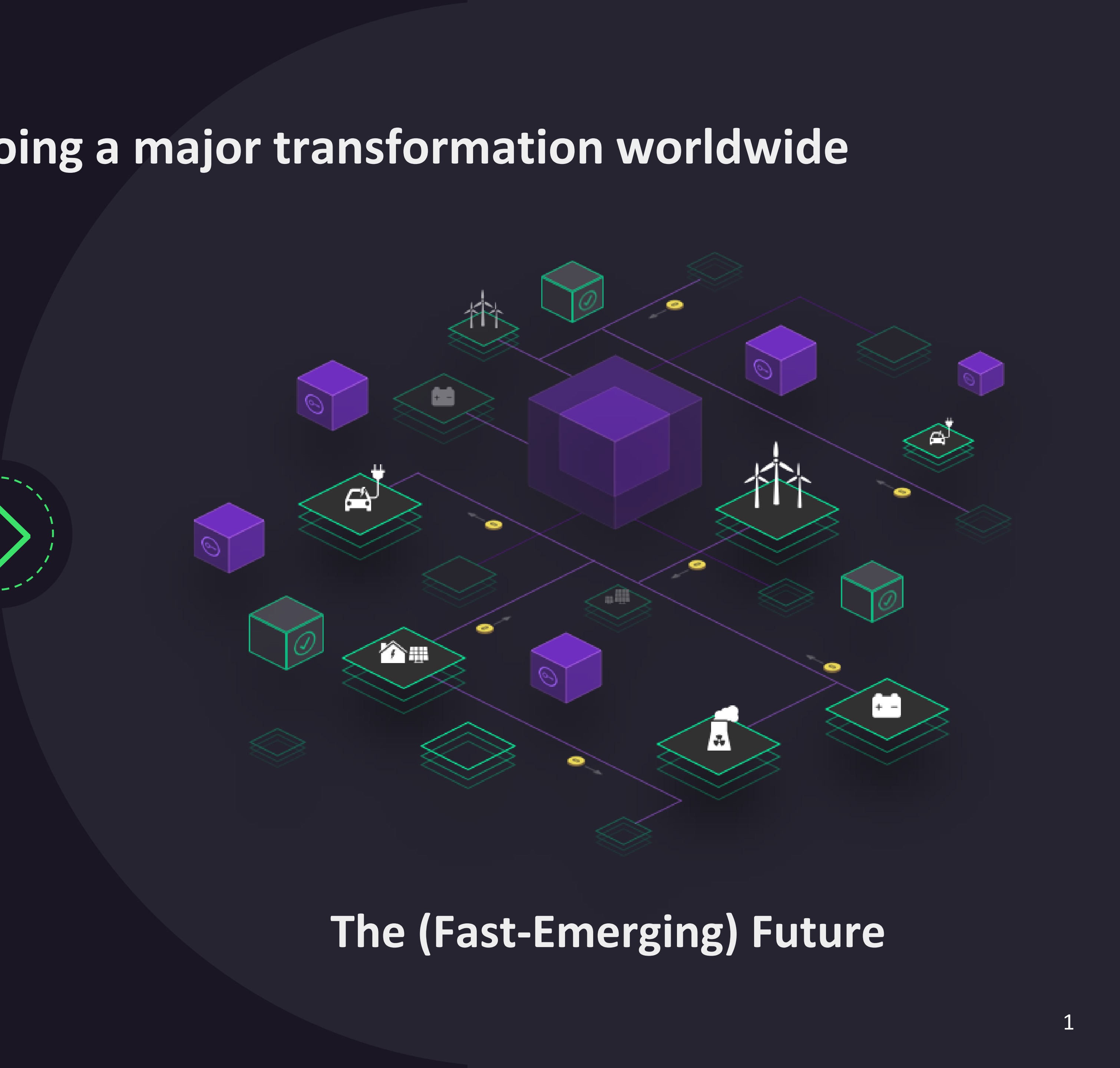
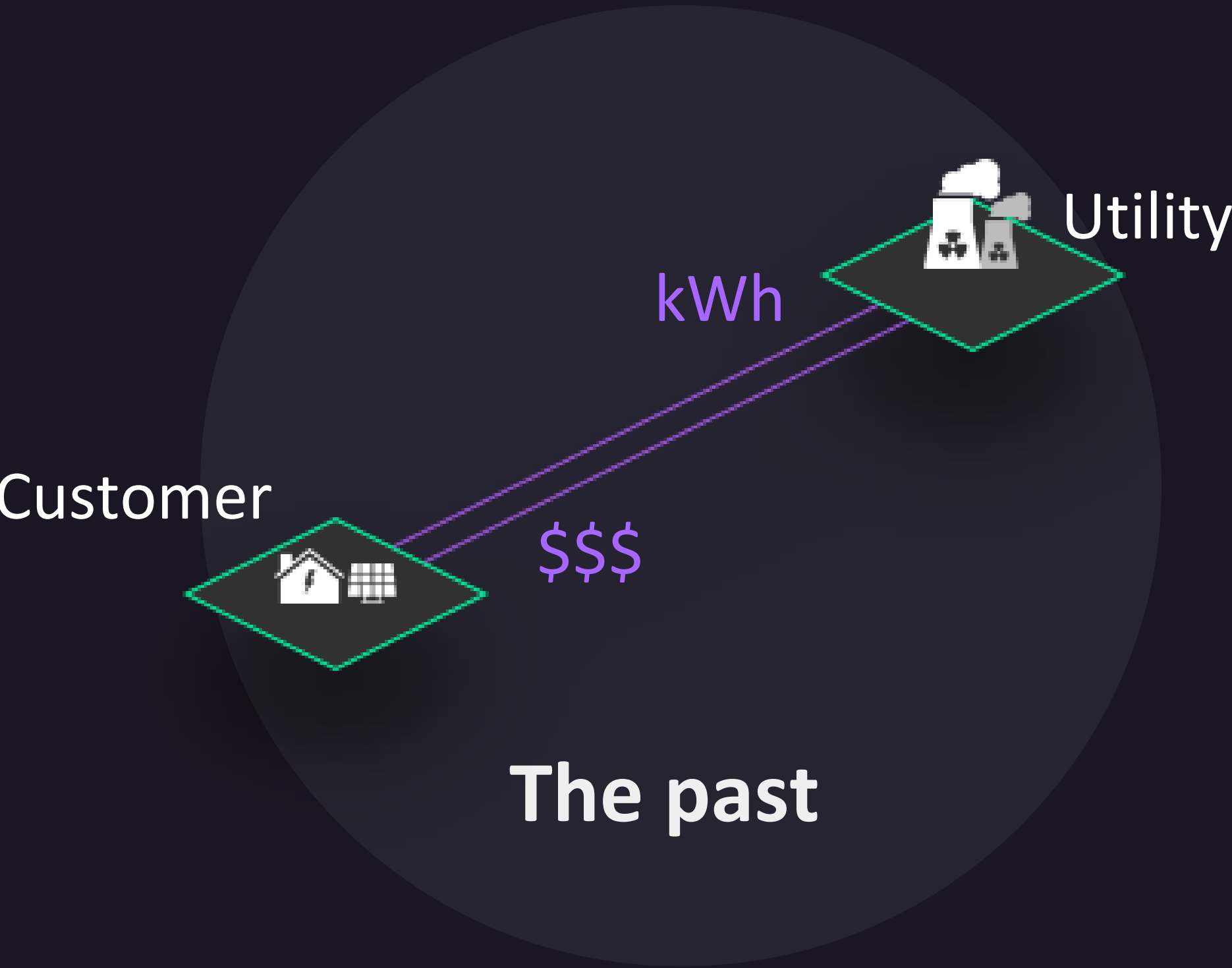


Using blockchain to reach deep decarbonization

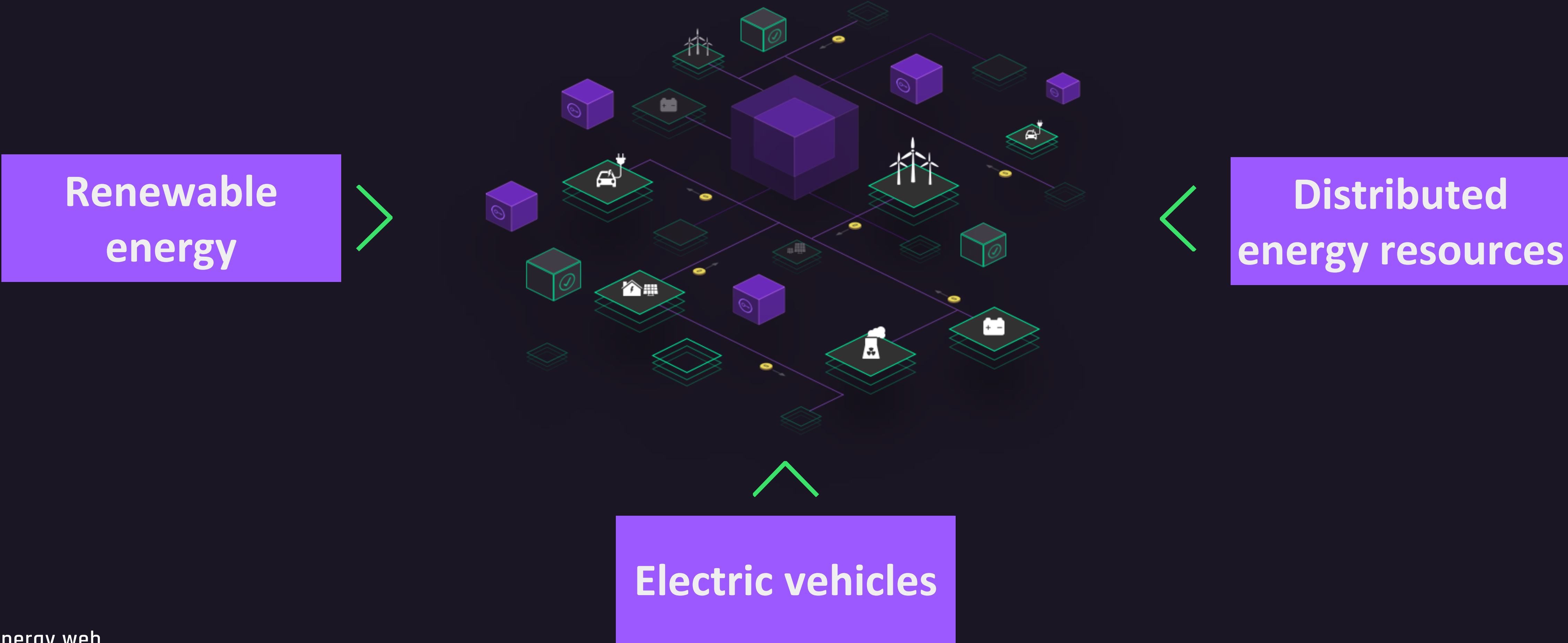
IRENA Innovation Day ••• Montevideo, Uruguay
17 July 2019



The electricity sector is undergoing a major transformation worldwide

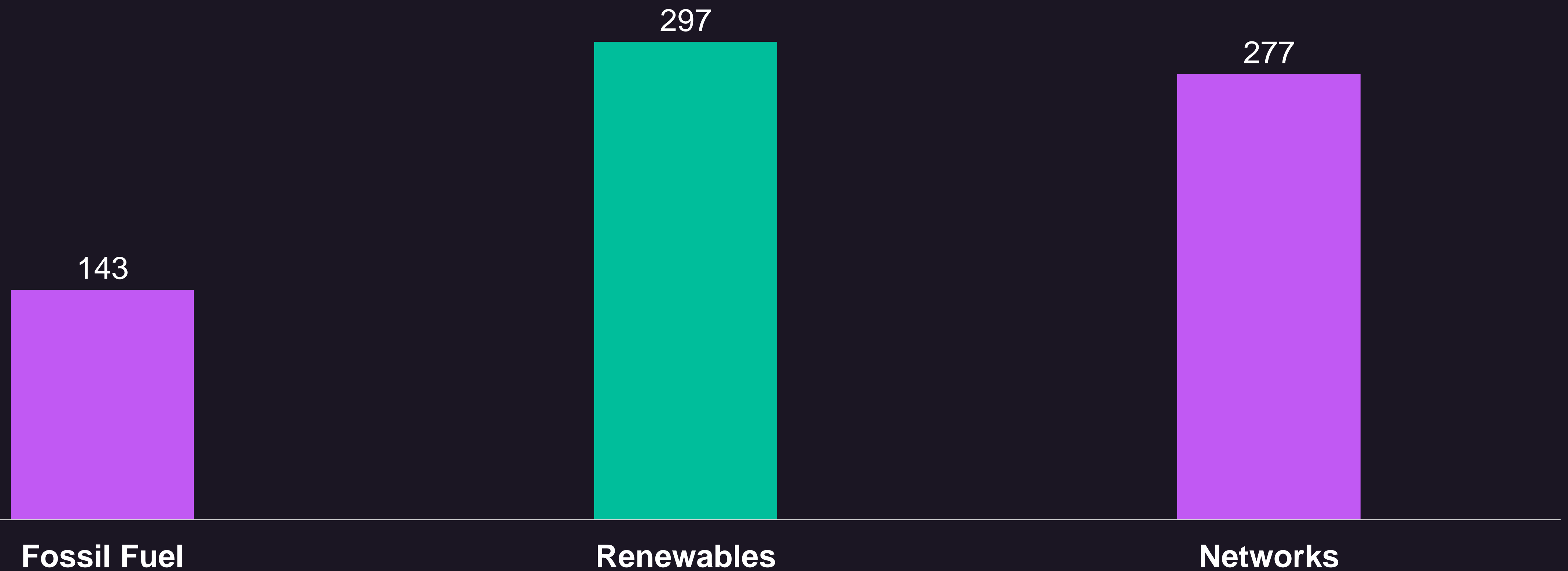


This transformation is being enabled by various types of investments—
and making energy systems more complex



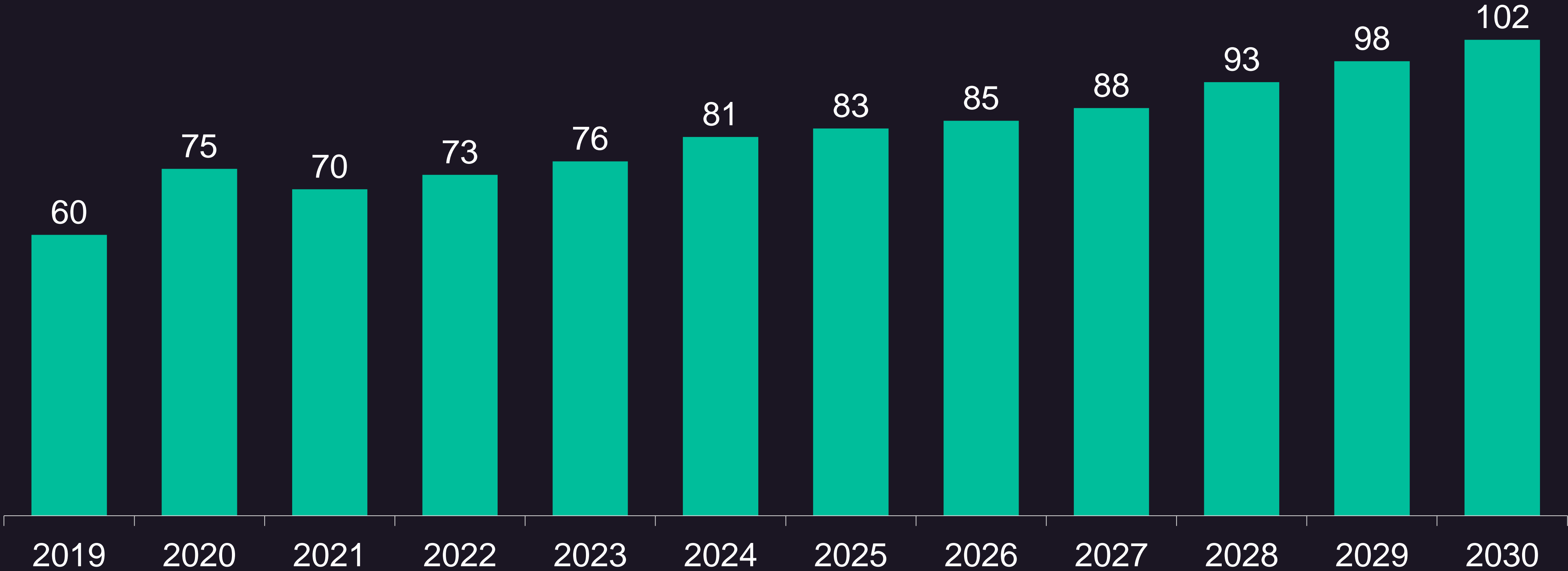
The electricity sector is undergoing a major transformation worldwide: renewables

Worldwide investments in the electricity sector, \$ billions



The electricity sector is undergoing a major transformation worldwide: DERs

Global annual investment in DERs*, \$ billions

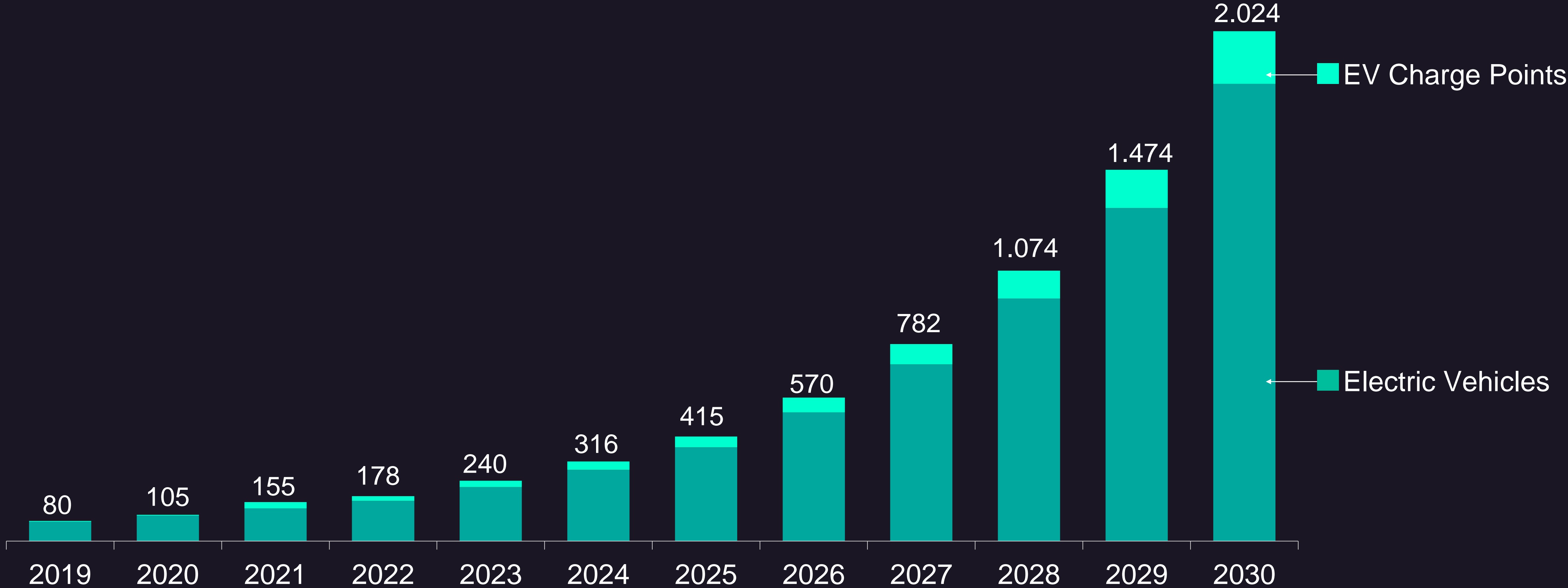


DERs include smart meters, smart thermostats, "other residential appliances" (i.e. water heaters, HVAC, etc.), residential PV systems, commercial flexible loads, and battery systems (residential + commercial BTM).



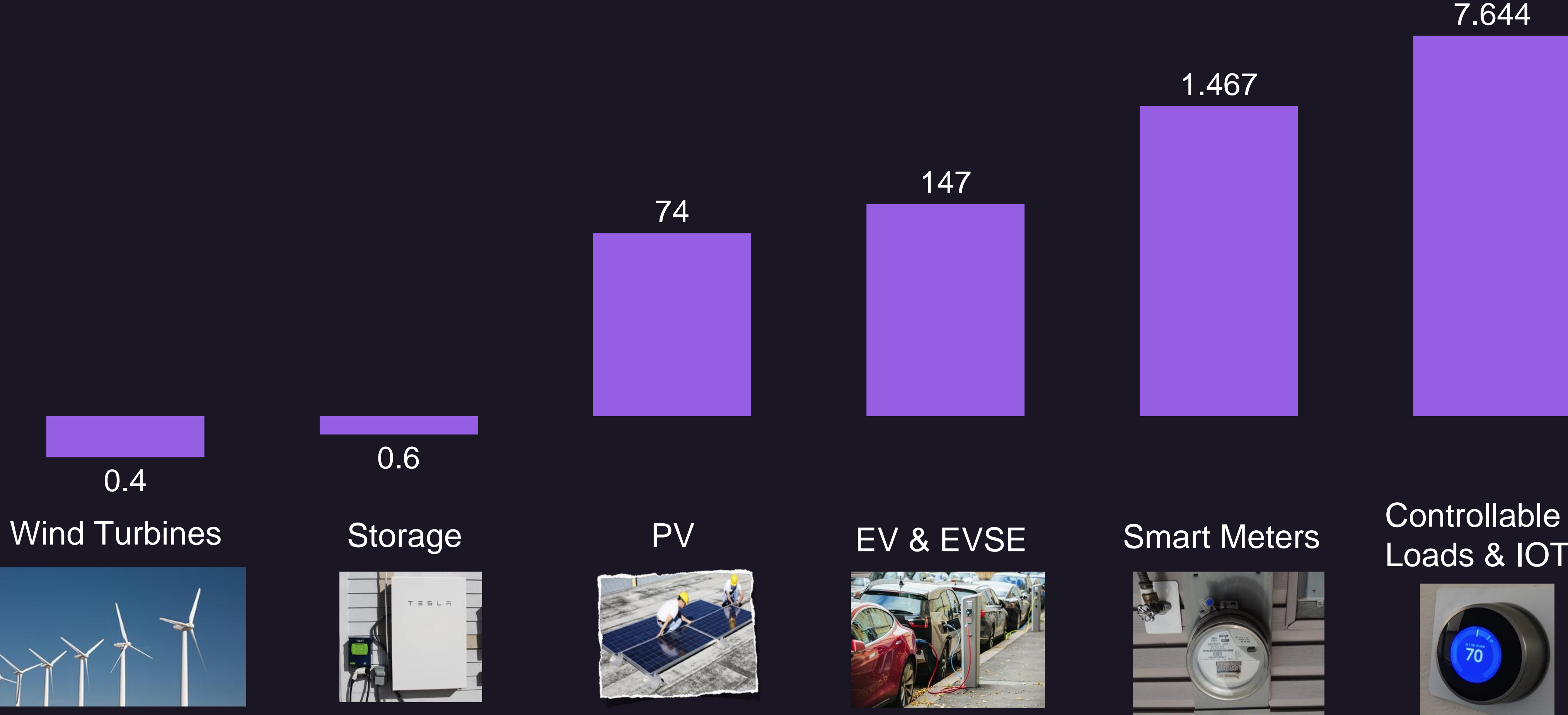
The electricity sector is undergoing a major transformation worldwide: electric mobility

Global annual investment in EVs and EVSE, \$ billions



9 billion devices are forecast to become internet-connected by 2025

Number of devices, millions, by 2025



Energy Web Foundation (EWF) is accelerating the energy transition with blockchain and decentralized technologies to scale consumer participation

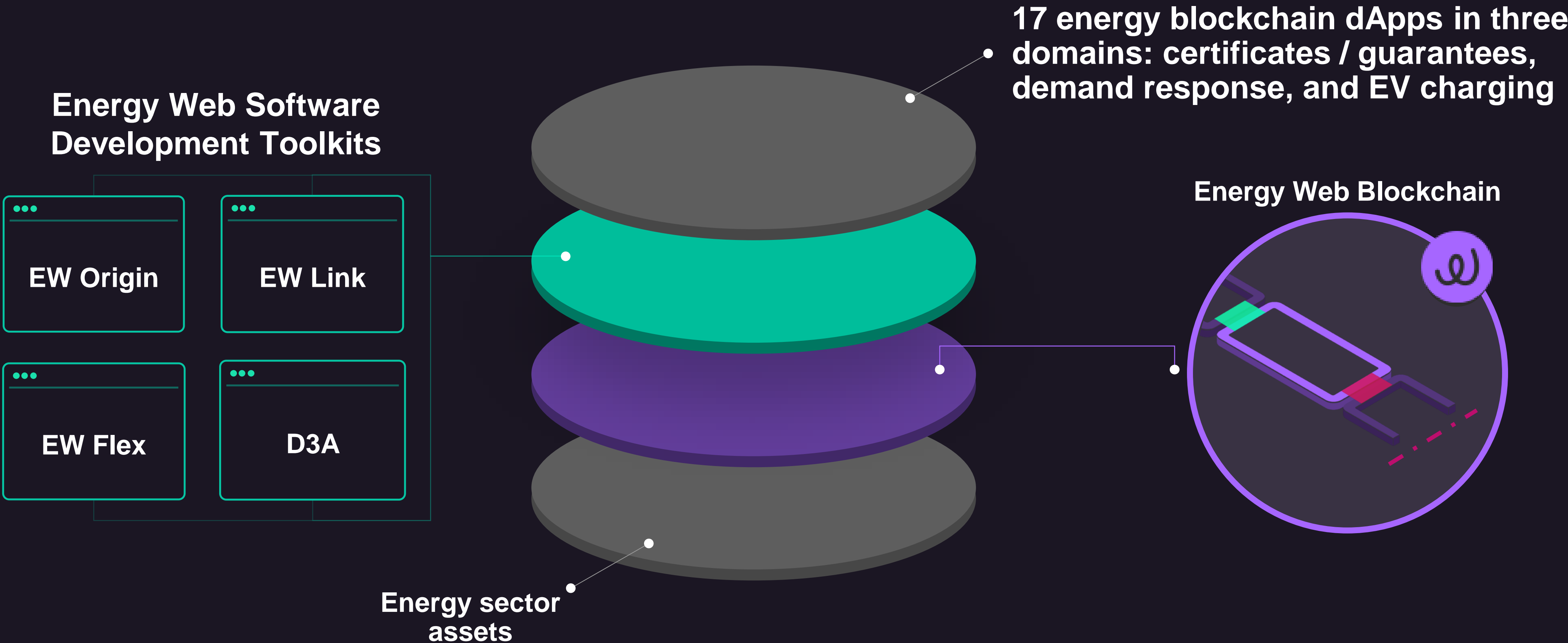


What EWF has achieved so far: EW Community includes 100+ companies

The image displays a collection of logos for various companies, organized into three main categories:

- Corporates:** Includes logos for major energy and utility companies such as Centrica, STEDIN, TEPCO, SPgroup, ENGIE, Sempra Energy, TWL, elia group, equinor, AEMO, Iron idea labs, agl, Eneco, Shell, e-on, Exelon, SIEMENS, EnBW, 3Degrees, CHUBU Electric Power, wipro, DUKE ENERGY, PG&E, SB Energy, TENASKA, fluvius, APG, SRECTrade, TOTAL, swisspower, ptt Group, innogy, Q CELLS, 国网电动汽车服务 (State Grid EV Service), AES, and IBERDROLA.
- Startups & Vendors:** Includes logos for technology and energy startups such as TurningTables, appliedblockchain, LO3 ENERGY, Wirelane, FLEXIDAO, shine, SHIZEN ENERGY, CROWLEY CARBON, Slock.it, SOLARA, ECOHZ, WIREPAS, verv, SHARE & CHARGE, swytch, trust power, FOHAT, ELECTRON, gridX, greyp, INSELBERG, netObjex, and brainbot.
- Financial Organizations:** Includes logos for investment firms and venture capitalists such as BLACKHORN VENTURES, QCP CAPITAL, 1kx, SCYTALE VENTURES, VITO VENTURES, BLOCKCHAIN CAPITAL, radicle impact, Merkle Tree Capital, nakamo.to, and Digital Virtues.

What EWF has achieved so far: open-source EW Technology is now “live”



● **Example:**

Electric vehicle (EV) innovations

Blockchain is useful for EVs to meet their potential for energy storage, carbon credits, and new demand for renewable energy



- ✓ Create seamless EV charge payments across EV charge point operators
- ✓ Documenting and settling battery storage (“flexibility”) services from EVs
- ✓ Automating renewable energy purchases based on EV charge volumes among individual vehicles and fleets
- ✓ Providing time-sensitive incremental carbon credit issuance, tracking, and reporting from EV charges

Blockchain enables incremental carbon credit solutions for EVs

The first EWF pilot of this type was designed to meet needs of California's Low Carbon Fuel Standard (LCFS) highlights value proposition

Time-based incentives

- Timestamp of kWh charge triggers the California Air Resource Board (CARB) formula for LCFS based on season and time of day of charge

Transparent, auditable smart contracts









- The pilot tested smart contracts that were customized for LCFS based on CARB's formula for EVs

New business models

- Utilities and others can become aggregators of incremental carbon credits via greater automation
- Aggregator can distribute a share of credit's value to EV owners

Data from real EVs that participated in first LCFS pilot in Bay Area

Anonymized asset data came from auto manufacturer's database and included 20 EVs

#	Owner	State	Type	Incremental Credits (μg)	Total Charge (kWh)	Actions
0	47P1	California	Incremental Smart Charging	2,689,809	36.348	
1	41P0	California	Incremental Smart Charging	14,492	8.400	
2	56P1	California	Incremental Smart Charging	1,793,592	27.362	
3	29P0	California	Incremental Smart Charging	1,765,515	15.559	
4	63P5	California	Incremental Smart Charging	1,588,046	29.487	
5	44P5	California	Incremental Smart Charging	1,706,998	33.390	
6	63P2	California	Incremental Smart Charging	0	0.000	
7	63P3	California	Incremental Smart Charging	2,012,407	20.510	

Pilot calculated incremental carbon credits based on EV charges

Origin

Assets Certificates Demands Admin

Guest

Claims Report For Sale Bought / Sold Detail View

For Sale

All Organizations


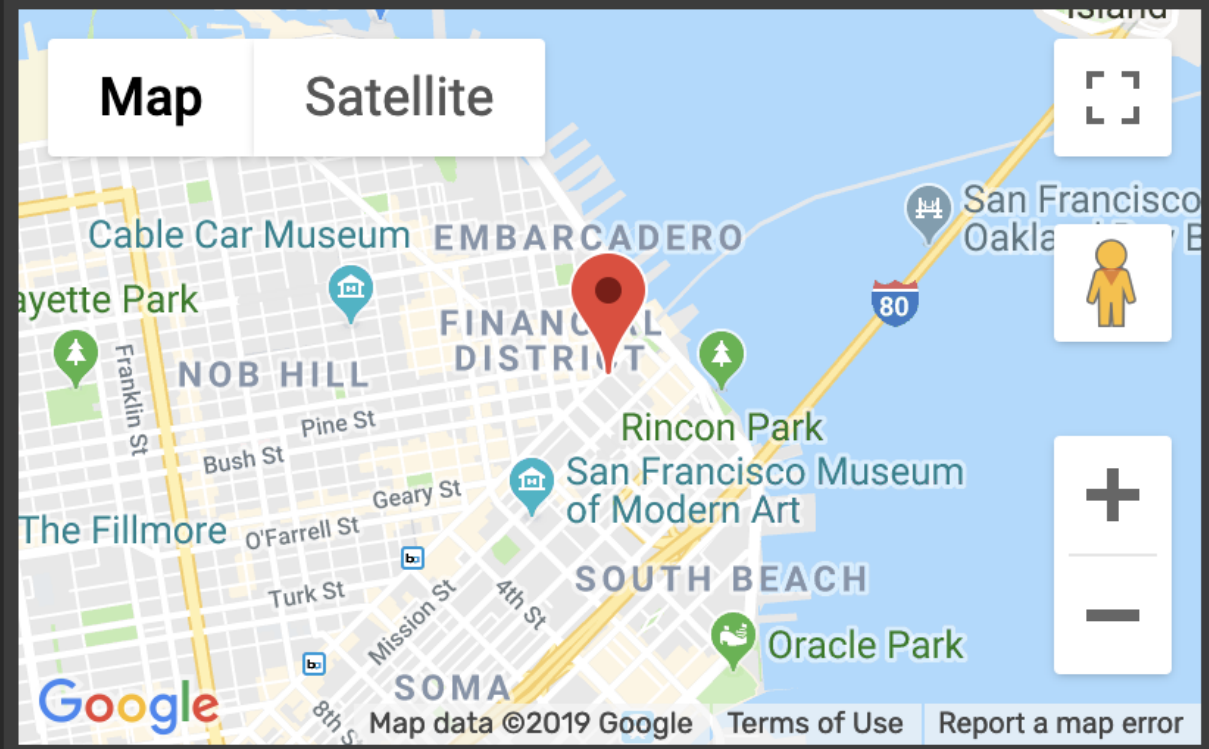
#	Owner	Asset Type	State	Certification Date	Incremental Credits (µg)	Charge (kWh)	Actions
0	36P7	Incremental Smart Charging	California	Fri May 03 2019	138,481	8.300	
1	41P0	Incremental Smart Charging	California	Fri May 03 2019	10,645	2.100	
2	29P0	Incremental Smart Charging	California	Fri May 03 2019	139,012	7.643	
3	47P1	Incremental Smart Charging	California	Fri May 03 2019	1,463,250		<ul style="list-style-type: none"> Show Certificate Creation Tx Show Initial Logging Transaction Show Certificate Details Buy
4	56P1	Incremental Smart Charging	California	Fri May 03 2019	561,247		
5	63P5	Incremental Smart	California	Fri May 03 2019	367,025	23.572	

Pilot showed new details about incremental carbon credit claims

Detail View

2 [Find Certificate](#)

Certificate Id	Current Owner	Claimed	Producing Asset Id	Co2 saved (kg)	Certified Energy (kWh)	Creation Date
2	29P0	no	3	0.139	7.643	03 May 19

Asset Owner 29P0	Certified by Registry none	Kind Production	Geo Location 37.792866, -122.396448
Asset Type Solar 	Other Green Attributes n.a.	Commissioning Date 03 May 19	
	Public Support n.a.	Nameplate Capacity 40.000 kW	



THANK YOU

Contact Doug Miller to learn more about EWF
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[@DougJMillerJr](https://twitter.com/DougJMillerJr)