



Wells Fargo Innovation Incubator (IN²) Webinar Series

Sept 15, 2020



Agenda

Welcome from IN²

- Trish Cozart, IN² Program Manager, NREL

Cleantech Group

- Todd Allmendinger, Director of Consulting & Research, Cleantech Group
- Anthony Deorsey, Consultant, Cleantech Group
- Louis Brasington, Senior Associate, Cleantech Group

Briefing

Housing

15 Sept 2020



Description

- Integrating residential assets for grid services
- Creating income opportunities for homeowners

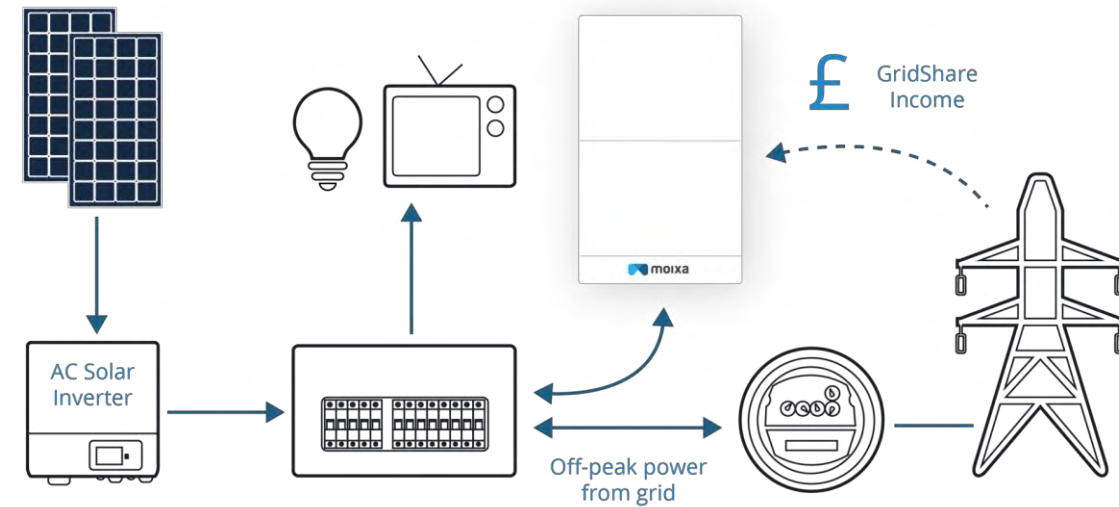
Trends

- Increasing self-consumption (savings, resiliency)
- Monetizing assets through California Self-Generation Incentive Program (SGIP)
- Adopting more personal electric vehicles

Opportunity for innovation


- Standardized low-cost connectivity for solar and other DERs
- Localized, real-time flexibility management
- Vehicle-to-house enablement

Residential Asset Integration




Source: Moixa

 **Shifted Energy (US)** - Off-tank controller for residential electric water heaters, enabling demand aggregation and grid services. Accepted onto Free Electrons 2020 cohort, March 2020

 **ConnectDER (US)** – Plug and play residential DER integration device to provide utilities with universal access to DER data. Raised \$7.25 million Series B from Clean Energy Ventures, Skyview and Avista, January 2020

 **Leap (US)** - Flexibility aggregation platform enabling batteries, electric vehicles, and HVAC systems access to demand response programs, wholesale markets, and real-time pricing. Raised \$8.2 million Series A + debt led by Union Square Ventures, January 2020

 **Moixa (UK)** – Residential battery systems and software to manage, optimize and aggregate batteries, including EVs, for grid services. Raised \$5.8 million growth equity funding from ITOCHU, July 2020

Investors



Ecosystem



Description

- Dynamically managing energy assets
- Reducing energy bill through self-consumption optimization and system monitoring

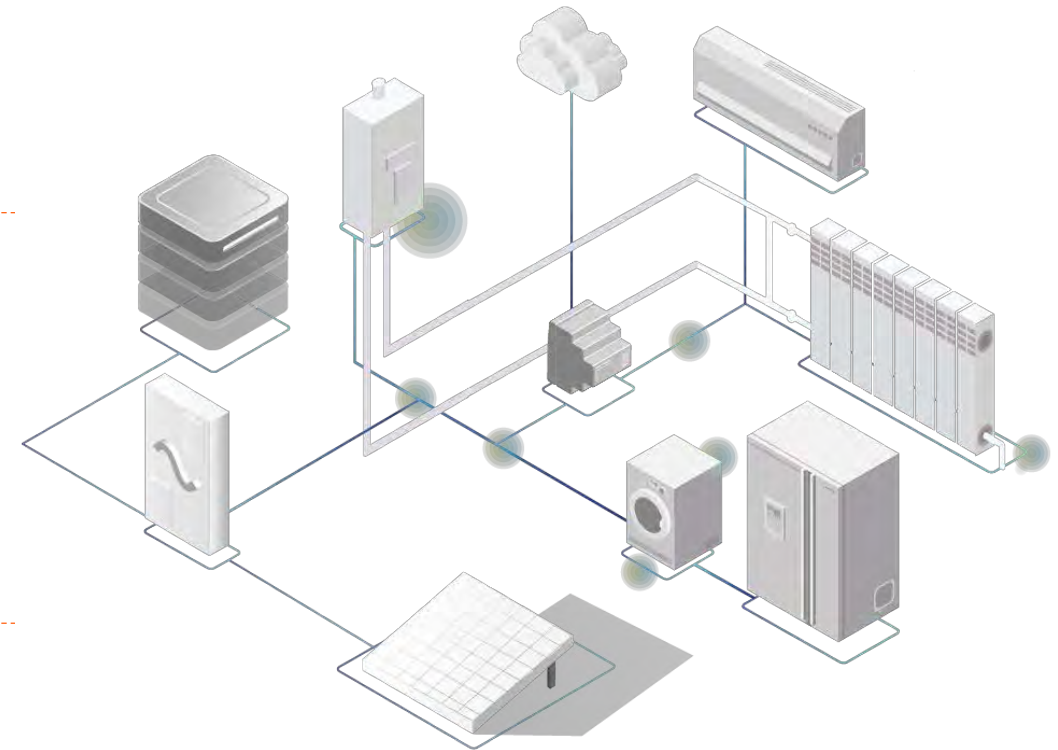
Trends

- Addressing disengaged customer base
- Targeting multi-residential buildings
- Converging grid-edge system assets

Opportunity for innovation

- Zero upfront fee business models
- End-to-end customer energy services
- Increasing sophistication of algorithms

Local system energy management



Source: Kiwigrid

Energy Optimization : Innovators and ecosystem



Parity (US) – AI-based Energy-efficiency-as-a-Service HVAC control platform for multi-residential buildings. Raised \$1.25 million venture debt from Silicon Valley Bank for US expansion in 2020



Greencom Networks (Germany) – White label home energy IoT solutions for distributed energy resources management. Acquired Shine, April 2019, integrating customer energy management suite

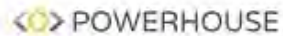


Camberline Technologies (US) - Enables time-of-use electricity pricing for households, typically only offered to industrial users



Stratis (US) – IoT Platform for real-time energy data analytics for multifamily and student housing. Acquired by RealPage, Sept 2020

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Ecosystem



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Residential Hydrogen Systems



Description

- Storing excess electricity as hydrogen for local heat & power applications
- Supplying backup power, seasonal storage, peak-period, power outage support

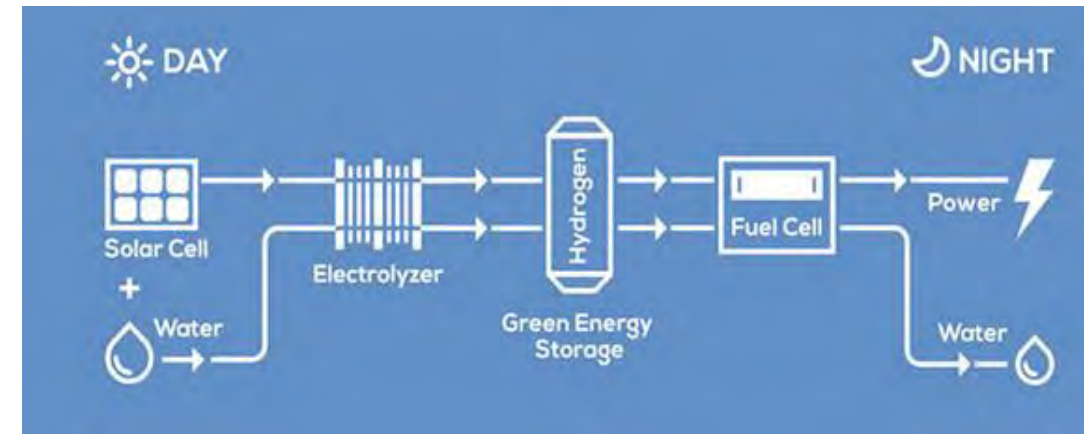
Trends

- Decreasing hydrogen system & renewable costs
- Increasing self-production / consumption
- Developing market in Europe

Opportunity for innovation

- Integrated systems (production, storage, fuel cell)
- Hybrid li-ion / hydrogen storage systems
- Pre-pressurized storage (increase efficiency)

Integrated residential hydrogen system



Source: ElektrikGreen



ElektrikGreen (United States) – Residential hydrogen power conversion, energy storage, software and monitoring system. Integrated Enapter AEM Electrolyzer as tech partner, July 2020



Sylfen (France) – Integrated system for building heat and power production, utilizing hydrogen production, li-ion, and hydrogen storage systems. Award \$1 million grant, BPI France, for ALTAIR project, Feb 2020



Ergosup (German) - Hydrogen generation solutions, using direct electrolysis of water under very high pressure, with off grid residential applications. Raised \$12.5 million, Series B February 2020



H2 Store (Aus) – Metal alloy hydride solid-state storage material for residential hydrogen storage applications. Raised \$3.5 million grant, ARPA-E, March 2019

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Ecosystem



Housing

Overview

» Business Activity

Circular Economy

Decarbonization & Electrification

Cities & Urbanization

Digitalization, Decentralization, Automation

Resilience

Housing

Business activities for deep dives





Description

- Approaching construction via tech-enabled building design, construction and installation
- Using low-carbon, versatile materials

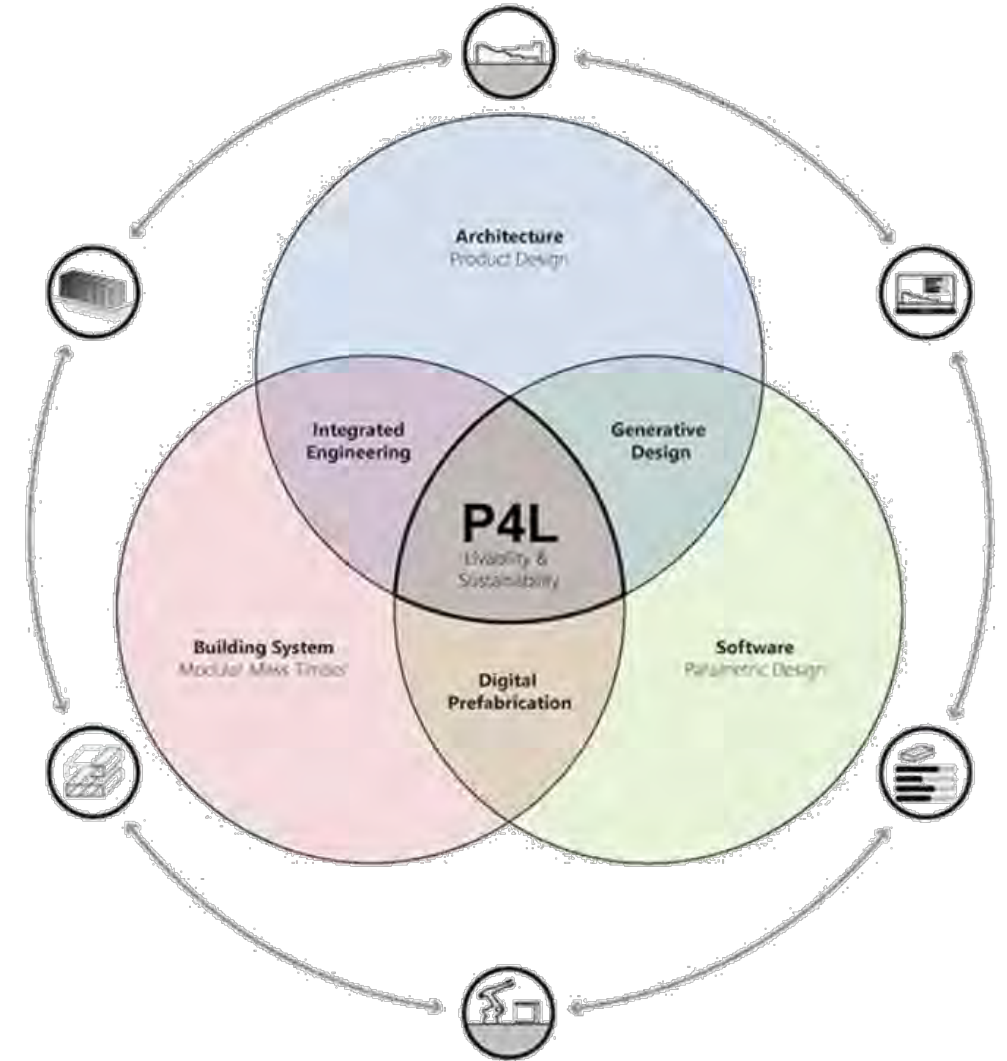
Trends

- Addressing urban densification & affordable housing
- Leading with regulation (CA green building)
- Addressing fragmented building supply chain

Opportunity for innovation

- Vertically integrated construction services
- Prefabricated & off-site manufacturing
- Design for low cost distribution

Integrated housing development



Source: Intelligent City



Intelligent City (Canada) – Vertically integrated design, development and delivery service offering for carbon-neutral prefabricated mid-rise urban housing. Winner of Breakthrough Energy Solutions Canada grant, Feb 2020.



Ecoworks (Germany) – Turnkey apartment renovation services using pre-fabrication, digital processes, and energy management systems (heat pumps, storage HVAC, solar). Raised \$5.6 million seed from Surplus Invest, PropTech1 Ventures, April 2020



Ten Fold Engineering (United Kingdom) – Un-folding shape-shifting buildings, structures, and devices for easy transportation



Blokable (United States) – Vertically integrated solution, partnering with land developers and service providers to offer multi-residential housings through Housing Development as a Service

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Ecosystem





Description

- Localizing water purification to the home
- Reducing use of plastic bottles and waste

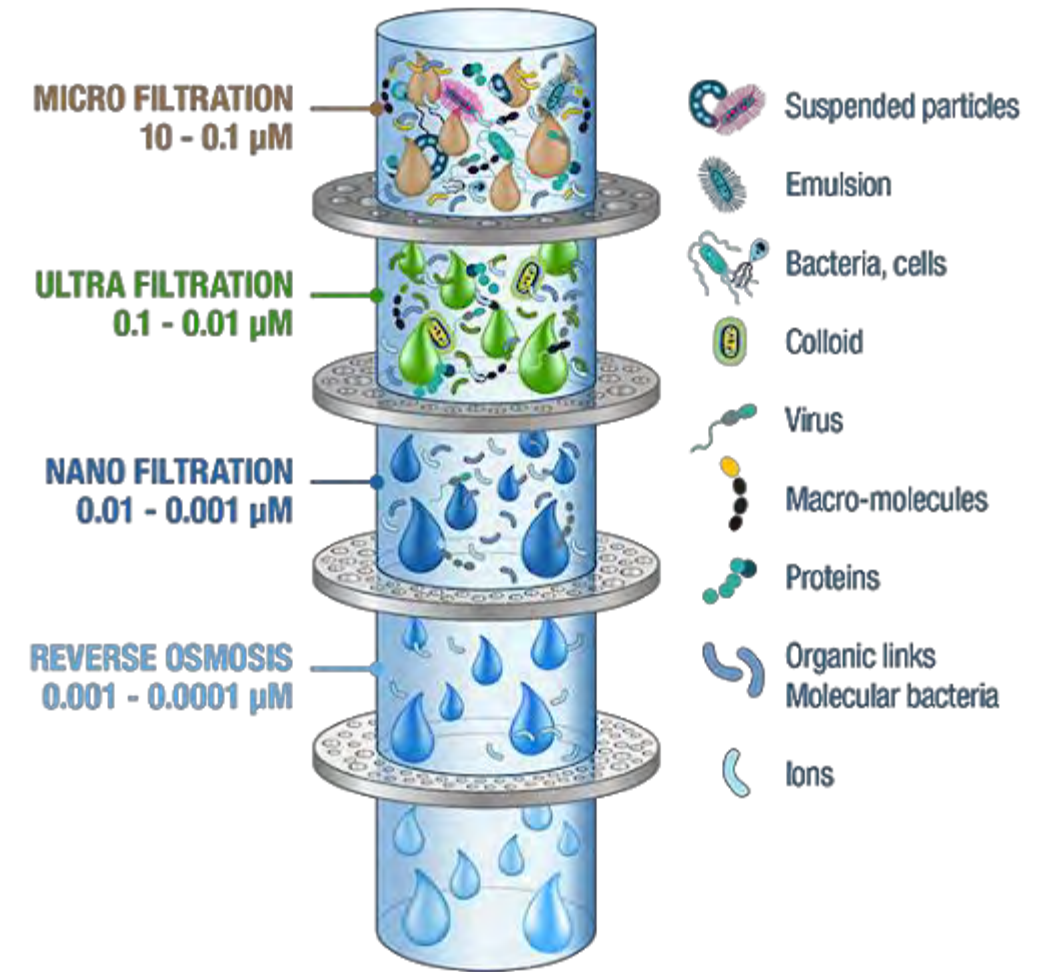
Trends

- Straining water management from urbanization
- Lacking / contaminated treatment infrastructure
- Increasing consumer awareness (COVID-19)

Opportunity for innovation

- Small-scale, low-cost, purification systems
- Direct-to-consumer subscription services
- Microbiological filter for virus removal

Water filtration system



Source: Muchmorewater

Residential Water Purification: Innovators and ecosystem



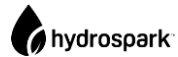
Mitte (Germany) - Connected home-use water purification and enhancement systems. Raised \$1.1 crowdfunding from Kickstarter, Indiegogo, Republic, Jan 2020



Second Nature (United States) – Home air and water filter subscription service. Raised \$16.4 million Series C funding, March 2020



AquaGuidance (United States) - Drinking water filter system which removes live viruses without chemicals, power or pressure. Raised \$3 million from Blue Planet Group, March 2020



Hydrospark (United States) - Self-contained micro hydroelectric energy system for residential and business applications including water purification. Received \$295K seed, March 2019

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Ecosystem





Description

- Monitoring and purification air quality in-room
- Removing virus, particulates and contaminates

Trends

- Increasing indoor urban air pollution
- Increasing consumer awareness (COVID-19)
- Demanding real-time information

Opportunity for innovation

- Adaptive user / air quality algorithms
- Predictive monitoring, control and regulation
- Cloud-connected monitoring systems
- Advanced filtration systems

Indoor filtering system



Source: Molekule



Aeris (United States) – Domestic AI air purifiers that learn and adapt to user's habits and the air quality alterations in their home. Raised \$3.3 million Series A, August 2020



Urecsys (Israel) – Indoor air pollution software which monitors air pollution in real-time. Raised \$4 million Series A, March 2020



BioFlyte (United States) - Aerosol mass spectrometers air quality sensor which detects microbes and toxins in real-time. Raised \$1.25 million seed from Anzu Partners, June 2020



Molekule (United States) – Well developed internet-connected air purification devices. Raised \$58 million growth equity, Feb 2020. Investment totals \$96.35 million

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Description

- Integrating in-home appliances and energy assets
- Creating digital twin of home energy usage

Trends

- Maturing digital appliance market
- Saving up to 50% of HVAC and lighting bill
- Addressing security / data breach concerns

Opportunity for innovation

- Appliance management platforms / Digital twins
- Edge computing and localized processing
- Occupancy / comfort monitoring

Integrated smart buildings



Source: Wattsense

Home Automation: Innovators and ecosystem



SmartRent (United States) - Home automation and IoT software and hardware for multifamily building property managers, owners and operators, integrating third party hardware. Raised \$60 million growth equity, now totalling \$102 million



Wattsense (France) – Universal edge-computing smart building device-agnostic integration system. Raised \$3.2 million Series A, Oct 2019 to scale



Axis (Canada) – Solar-powered residential window automation system utilizing sensors, weather data and user preferences, to optimize for indoor comfort and energy efficiency. Raised \$3.5 million grant funding from Sustainable Development Technology Canada, January 2020

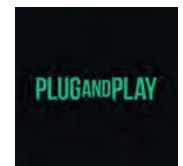


IOTAS (United States) - IoT-as-a-Service smart apartment platform for controlling and monitoring occupancy, energy management, leak and lighting. Raised \$8.5 million Series A, Oct 2019

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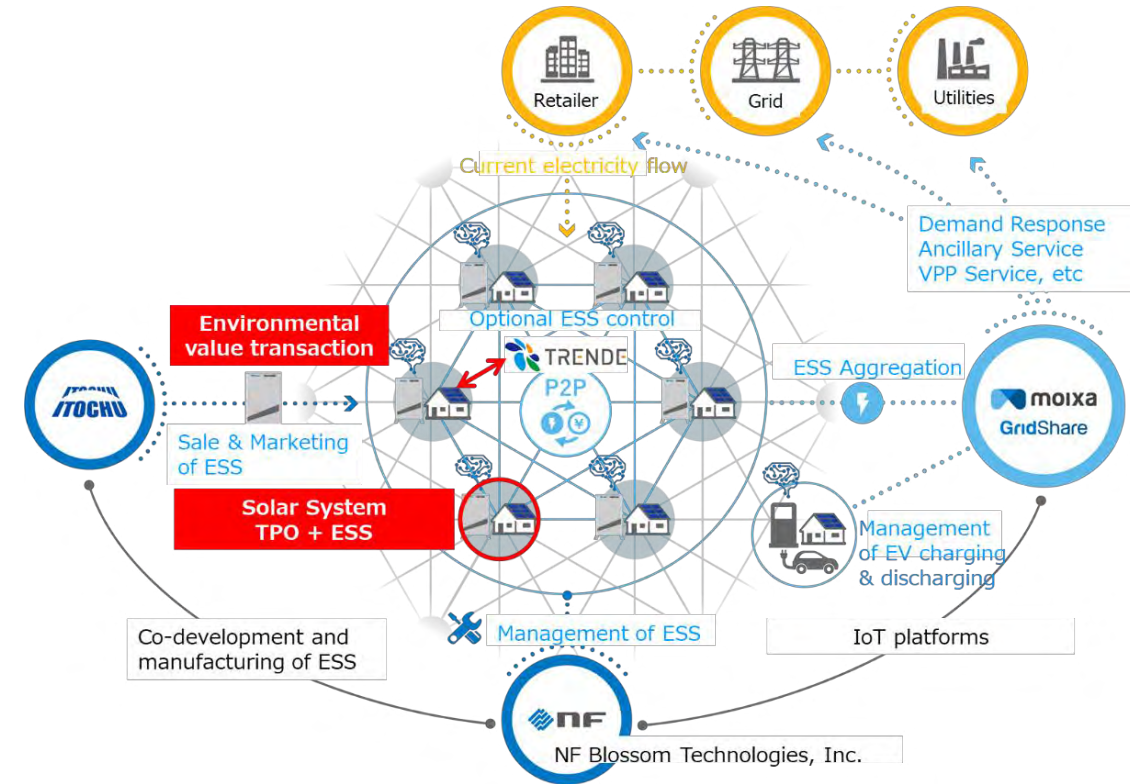


Ecosystem



Opportunity for innovation

- Direct-to-consumer energy services
- Peer-to-peer transactive energy services
- Consumer-to-service provider marketplaces



Data-driven Services: Innovators and ecosystem



Arcadia (United States) - Direct-to-consumer platform that enables consumers to enrol in clean energy programs, track account activity and view energy usage. Raised \$30 million growth equity, December 2019



Trende (Japan) – Alternative energy retailer, utilizing granular energy data to enable peer-to-peer transactive energy services. Raised \$9.3 million Series B from ITOCHU, June 2020



Grid4C (United States) – Uses AI analytics to identify faulty home appliances and alerts residential customers with costs and benefits, providing marketplace with access to local service providers



SparkMeter (United States) - Low-cost metering solutions for off grid / remote customers, enabling customer services, and billing services. Raised \$12 million Series A, August 2020

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Ecosystem





Description

- Identifying granular energy consumption data at appliance-level
- Identifying new business opportunities from consumer behaviour

Trends

- Increasing utility customer engagement
- Consolidating US market (Uplight, Tendril)
- Metering deployment limits market

Opportunity for innovation

- High resolution (Hz-MHz) software + sensors
- SaaS solutions compatible with smart meters
- Real-time consumption data

Appliance Load Disaggregation



Source: Researchandmarkets

Non-intrusive Load Monitoring: Innovators and ecosystem



Sense (United States) - Home energy monitor for real-time load status at appliance level. Raised \$10 million investment from MacKinnon, Bennett & Co and IDO Investments, driving total Series B funding to \$28 million



Verv (United Kingdom) – High frequency energy disaggregation via user installed device, analytics, software and service & peer-to-peer electricity trading platform. Raised \$8.5 million Series A, April 2019



Bidgely (United States) - SaaS solution for load disaggregation. Partnered with ITRON, Jan 2020, platform will be pre-integrated with Advanced Metering Infrastructure



Voltaware (United States) – B2B2C disaggregation algorithm + sensor to break down individual appliances from the total load, enabling home insights

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Description

- Offering insurance products with climate change-related provisions to better protect asset owners
- Modelling risk enhance ability to absorb cost

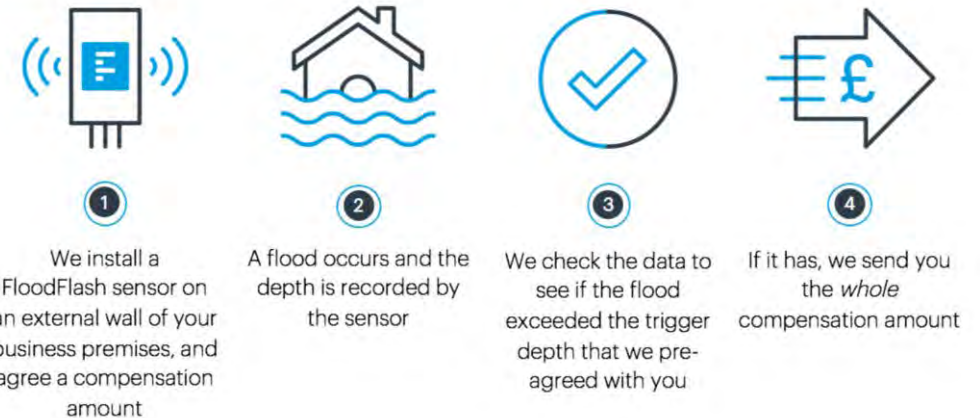
Trends

- Increasing insurance pay-out threat (climate change)
- Selling directly to consumers instead of using agents
- Shifting from passive to active insurance

Opportunity for innovation

- Using geospatial data, sensors and satellite imagery, to assess damage
- Event-based, automated insurance packages
- Integrating products with appliance data

Event-based insurance payout



Source: Flood Flash

Climate-related Insurance Services: Innovators and ecosystem



FloodFlash (United Kingdom) – Sensor's and a platform for instantly paying pre-agreed insurance settlement for property damaged by flood



Hippo Insurance (United States) – Smart home monitoring system + real-time insurance service for preventing and covering against fire and water damage

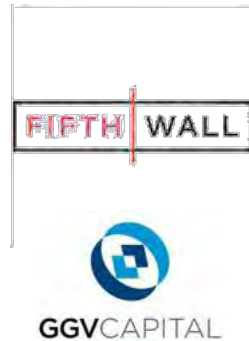


Cape Analytics (United States) - Geospatial property data for flood and fire risk for insurers and property owners. Received equity investment from State Farm Ventures, Jan 2020.



Homebound (United States) – Turnkey building services for low carbon houses with integrated insurance services

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Ecosystem





Description

- Mitigating the impact of extreme events
- Adapting as the event occurs and restore supply

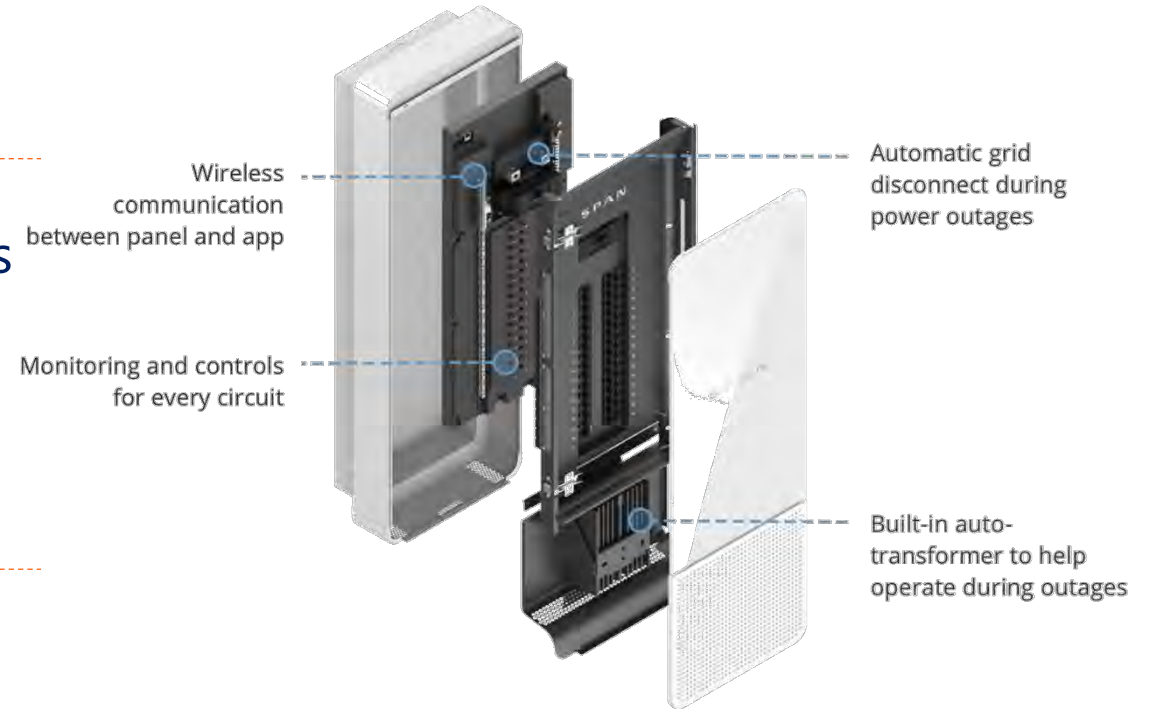
Trends

- Increasing threat from natural / malicious events
- Forcing innovation due to events (CA, Puerto Rico)
- Increasing consumer awareness (COVID-19)

Opportunity for innovation

- Consumer-side power outage functionality
- Granular sensor (meter) data enables appliance level usage-based resiliency opportunities
- Digital / solid-state hardware

Residential outage management



Source: SPAN

Outage Management: Innovators and ecosystem



Span (United States) – Residential hardware and software for, visibility, control at the edge-of-grid, supporting with power outage management. Raised \$10.2 million Series A, May 2020



SwitchDin (Australia) – Residential distributed energy resource controllers with capability to manage assets in microgrid mode for, off-grid resource optimisation. Raised \$3.5 million Series A, June 2020



Hembus (United States) - Micro-grid energy management platform, for residential energy management during power outages



Blixt (Sweden) – Solid-state circuit breaker, enabling smart metering, smart grid solutions and power outage management. Raised \$1.1 million grant funding, April 2020 from Swedish Energy Agency

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Ecosystem





Description

- Applying coatings and insulation material to building exterior and interior
- Mitigating against, high winds, fires, flooding

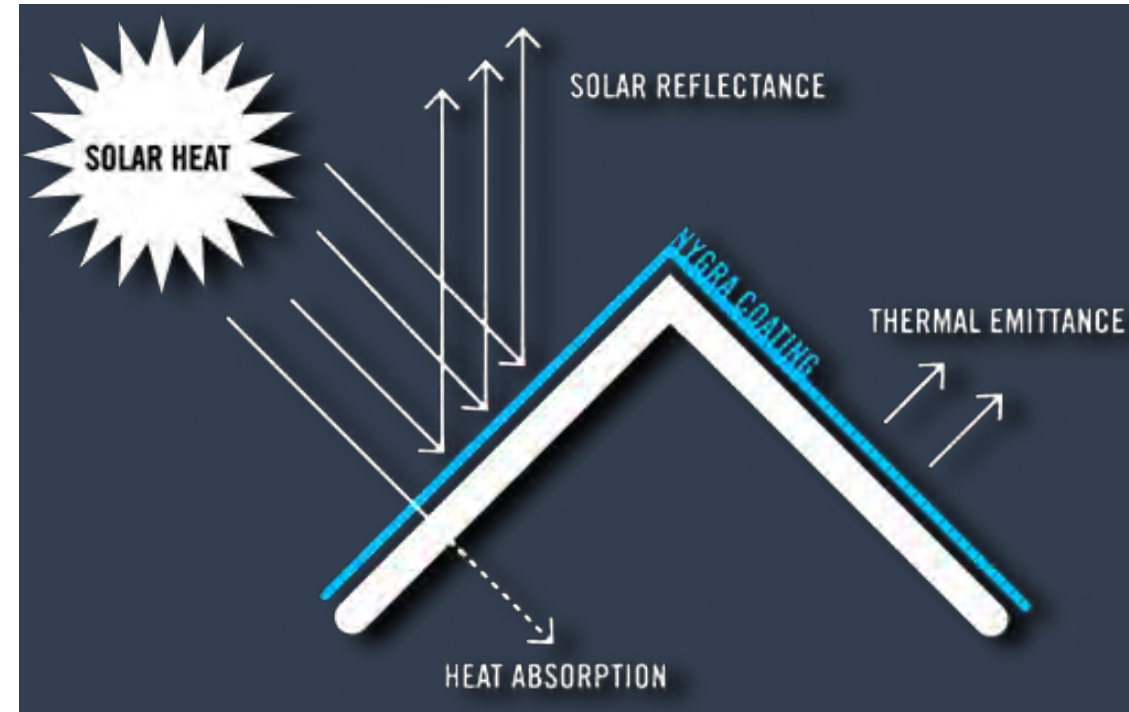
Trends

- Satisfying increasingly stringent fire-safety, performance regulations
- Saving on heating and cooling costs

Opportunity for innovation

- Multifunctional coatings, tunable properties, heat reflection energy regulation
- Adaptive material technology, to maximize cost savings and minimize energy use

Coating Mechanism



Source: Nygra Coatings

Housing Insulation & Coatings: Innovators and ecosystem



Enkoat (United States) – Coatings that collect, store, and release heat at a constant specific temperature to directly reduce the HVAC costs of residential and commercial buildings. Enrolled onto the Joules Accelerator, April 2020



Techstyle Materials (United States) – Thermochemical material, passively protecting wall assembly by pumping water vapor out, and regulating humidity levels and heat flows as thermal storage medium

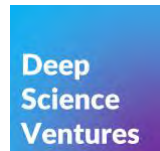


AeroShield (United States) - Super-insulating, transparent insert material for windows to regulated heat and to increase house resilience



Thermulon (United Kingdom) - Building insulation material to satisfy the criteria of fire-safety, performance and price criteria in the UK

Investors



Ecosystem



Championing Sustainable Innovation, Catalyzing Business Opportunities

Cleantech Group's research, consulting and events catalyze opportunities for sustainable growth powered by innovation.