

ICED Evidence Library

Frontier Technology solutions for improved energy services

Tags: Energy, Digital, Financial Services, Investment, Infrastructure, Energy



Using industry research along with professional experiences, ICED designed this toolkit to explore the application, benefits, use cases and foundational dependencies for the eight frontier technologies by sector. Creating a powerful snapshot of these technologies in a contextualized fashion so that DFID programme managers can understand and see the versatility of these frontier technologies. The tool should be used in conjunction with the ICED Digital Benchmarking tool, which contains indicators and qualitative questions exploring country's readiness for digital and frontier technology adoption. For more information on improving the use of digital solutions in programming please consult the ICED website or contact ICED programming.

Frontier Digital Technologies	Internet of Things	Blockchain	Big Data Analytics	Artificial Intelligence	3D Printing	Digital Financial Services	Online Marketplaces	UAVs																																																																																										
	<i>Internet of Things (IoT): Loosely defined as the "infrastructure of the connected society", IoT represents the networking of physical devices, vehicles, buildings, and other items embedded with electronics, software, sensors, actuators, and network connectivity that enable these objects to collect and exchange data</i>	<i>A digital ledger in which transactions made in bitcoin or another cryptocurrency are recorded chronologically and publicly.</i>	<i>The process of examining large and varied (structured or unstructured) data sets – i.e., big data – to uncover hidden patterns, unknown correlations, market trends, customer preferences and other useful information that can help organizations make more-informed business decisions</i>	<i>The theory and development of computer systems able to perform tasks that normally require human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages.</i>	<i>The action or process of making a physical object from a three-dimensional digital model, typically by laying down many thin layers of a material in succession.</i>	<i>Using digital technology to improve access to payments, savings, credit products and other financial services.</i>	<i>Establishing a virtual platform where users can transact goods and services digitally.</i>	<i>An aircraft piloted by remote control or onboard computers.</i>																																																																																										
Application & Benefits	<ul style="list-style-type: none"> · Enable 2-way communication with energy consumers and energy grid · Create prepaid metering infrastructure where power is supplied when payment is received · Generate real time information on energy use and management of consumption 	<ul style="list-style-type: none"> · Markets for renewable energy credits · Enable peer-to-peer trading · Smart meter data privacy 	<ul style="list-style-type: none"> · Using prepaid and smart metering, raise awareness about energy spend behavior · Observe energy data patterns to explore ways to forecast and manage demand · Support smart management of intermittent renewables 	<ul style="list-style-type: none"> · Optimise oil / gas exploration and operations through site analysis via AI 	<ul style="list-style-type: none"> · Manufacture spare parts for plant · Develop prototype models 	<ul style="list-style-type: none"> · Digital payment-enabled enterprise consumer financing for solar home system · Dedicated, unsecured digital household loan to purchase solar home system · Digital micro-grid maintenance and administration system · Energy appliance leasing bundled with utility service · Short-term solar home system enterprise-administered overdraft facility 	<ul style="list-style-type: none"> · Power sector transactions b/w suppliers and consumers · Consumer-to-consumer transaction for localised power services 	<ul style="list-style-type: none"> · Monitor and inspect condition of equipment and plant 																																																																																										
Rest of World Project Examples	M-KOPA Solar in East Africa	Wattcoin	Smart grids in OECD markets such as the Xcel Energy "smart grid" in Colorado, US	Google/National Grid pilot to use Deep Mind to better predict energy demand in UK	Use of 3D printing for fast prototyping of wind turbine models or spare parts (e.g. GE Additive)	Tanzania TANESCO agreement with MNOs to allow "Luku" prepaid directly from m-wallets.	The Simple Energy online energy platform in Colorado, US.	UAV inspection of equipment and solar panels with infrared cameras in OECD markets by companies such as Duke Energy in the US																																																																																										
Foundational Considerations	<table border="1"> <tr> <td>Reliable Broadband Networks</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Affordable Devices and Data</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>IT Capacity and Skills</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Digital Literacy and Use</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Digital Payments Infrastructure</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Availability of Capital</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Labour Market</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Ecosystem Policy & Regulation</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Reliable Energy Infrastructure</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Reliable Transportation and Logistics Infrastructure</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>								Reliable Broadband Networks									Affordable Devices and Data									IT Capacity and Skills									Digital Literacy and Use									Digital Payments Infrastructure									Availability of Capital									Labour Market									Ecosystem Policy & Regulation									Reliable Energy Infrastructure									Reliable Transportation and Logistics Infrastructure								
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