



ADVANCED ENERGY CENTRE
MaRS Cleantech | Ontario, Canada

CCRE Policy Forum

Paul Murphy, Nov 24, 2016





The Advanced Energy Centre's Mission is to

Foster the adoption of innovative energy technologies in Ontario and Canada

Leverage those successes and experiences into international energy markets

COMMUNITY ENERGY



ENERGY DATA ACCESS



UTILITY TRANSFORMATION

INTERNATIONAL

UTILITY TRANSFORMATION: NEWTONIAN SHIFT SIMULATION



Help utilities understand the pace of change in the energy sector, and inform intentional decisions to capture value and opportunities in a changing energy landscape



UTILITY TRANSFORMATION: STRATEGIC FORESIGHT



Help utilities understand the pace of change in the energy sector, and inform intentional decisions to capture value and opportunities in a changing energy landscape





THE FUTURE OF MICROGRIDS IN ONTARIO



NAVIGANT

RESIDENTIAL – PROFILE AND USE CASE

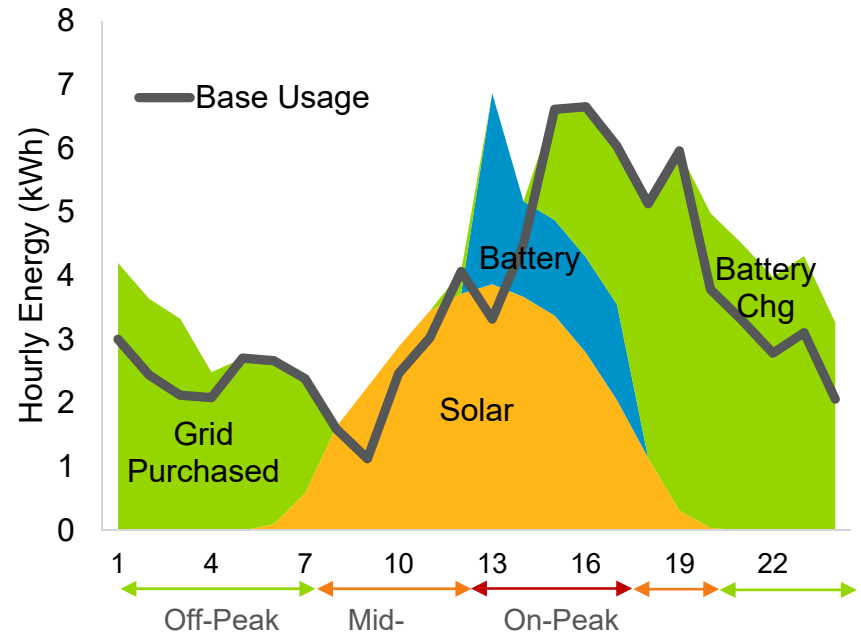
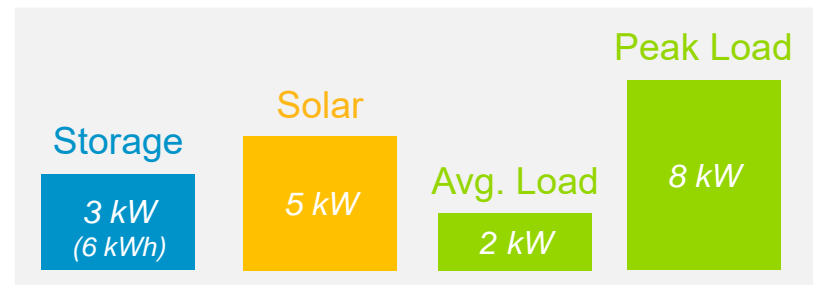
Customer Profile

- 18,000 kWh, large residential home (equivalent to a 90-95th percentile customer)

Microgrid Use Case

- Solar used to offset electricity consumption, and for net metering
- Battery used for TOU arbitrage
 - Battery capacity bid into DR auctions and OR market
- Battery, controller, and switchgear provide run-through resiliency

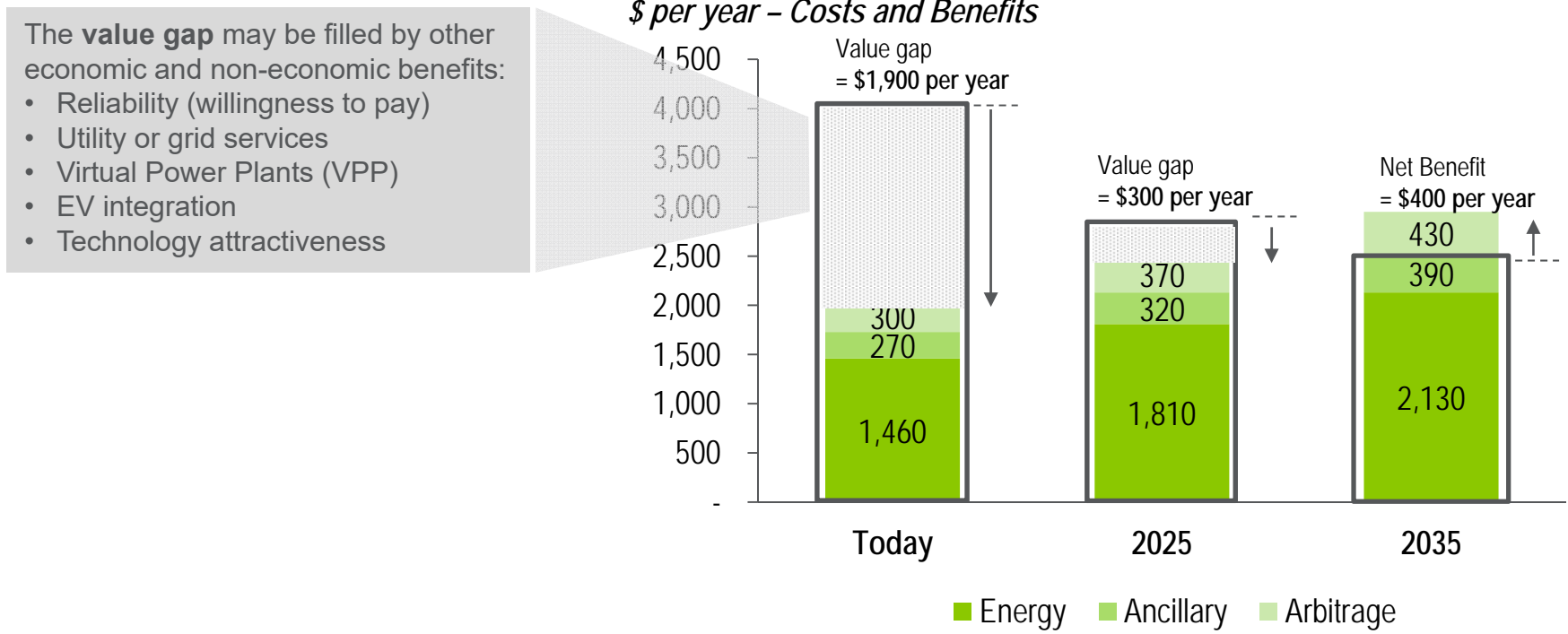
Core Microgrid Characteristics



RESIDENTIAL – COST-BENEFIT RESULTS

Based on a desired payback of 8 years, residential microgrids are not expected to be economic in the near term, but will become economic in the long term

- Residential microgrids may be cost effective if other non-economic factors are taken into account - the value gap to make microgrids economic today is **\$1,900 per year**



COMMUNITY - PROFILE AND USE CASE

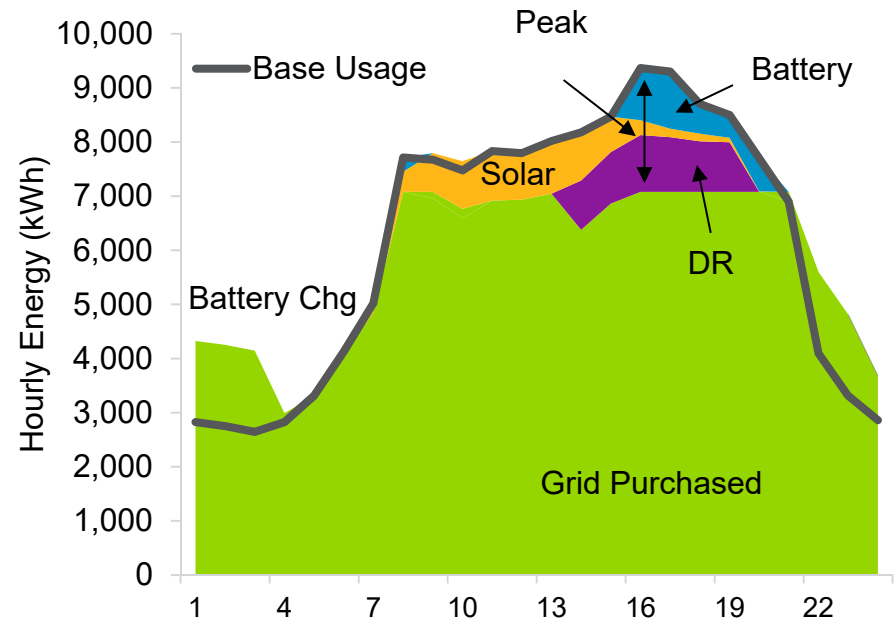
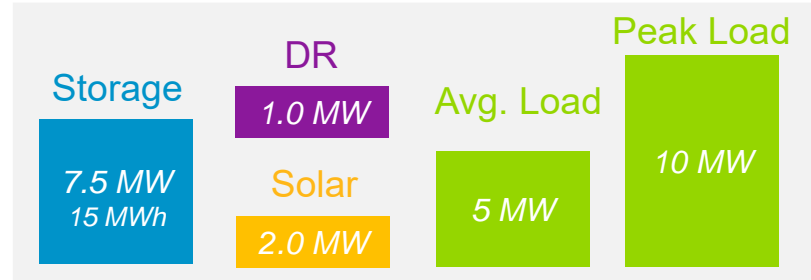
Customer Profile

- 12 MW distribution feeder load serving a mix of residential apartments and office space

Microgrid Use Case

- Solar used for off-setting electricity consumption, peak reduction, and battery charging
- Battery used primarily to reduce local distribution peak
 - Used to bid into OR market and DR auction, and
 - Battery, controller, and switchgear provide run-through resiliency (key emergency and disaster resiliency)
- Demand Response (DR) loads are also used to reduce the local distribution peak

Core Microgrid Characteristics

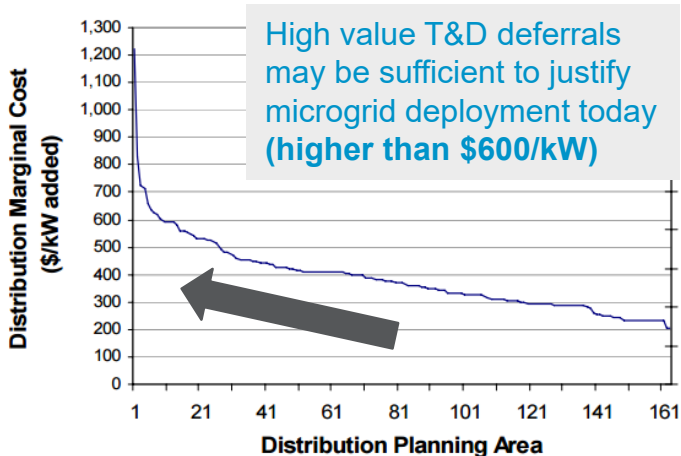


COMMUNITY – COST-BENEFIT RESULTS

Based on a desired payback of 10 years, the economics of community microgrids may not be positive today but are strong in the near and long term

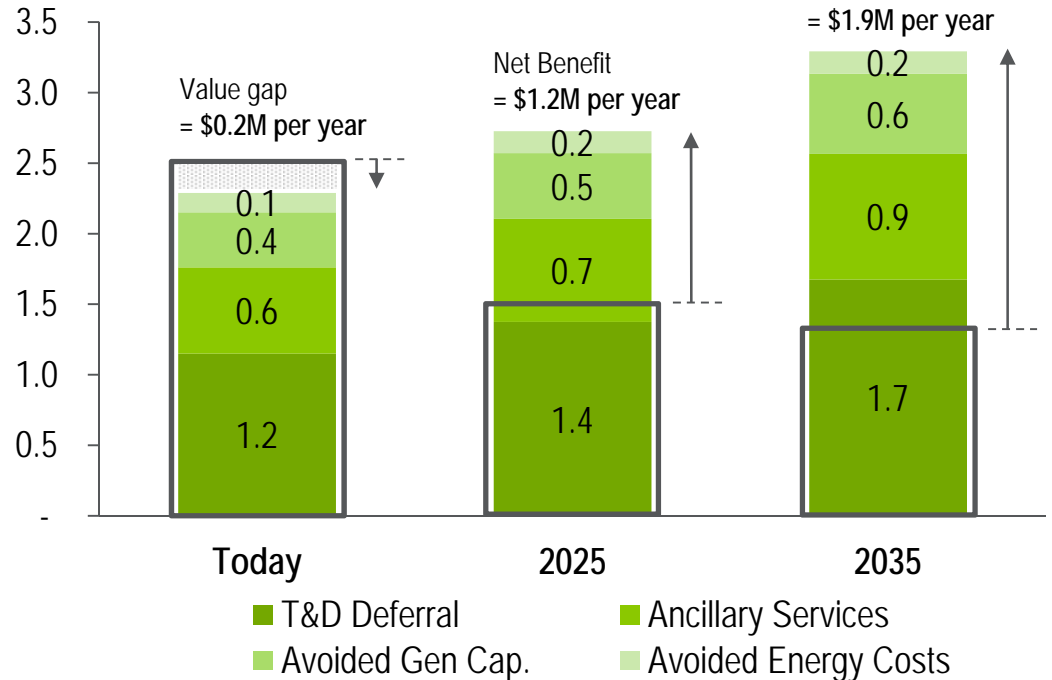
- The value gap needed to make community microgrids economic today is **\$0.2 million per year** – high value T&D upgrade deferrals and reliability benefits can close the value gap

T&D Marginal Costs



Source: PG&E/EPRI

\$M per year – Costs and Benefits

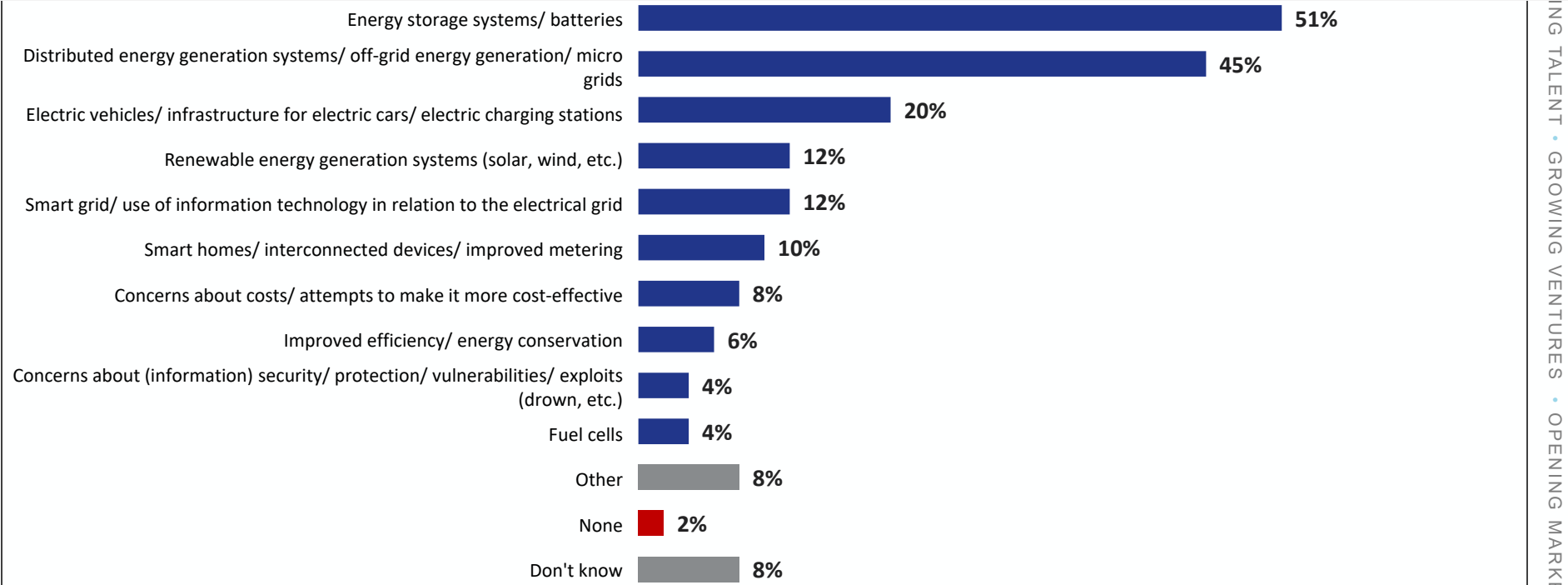


EDA's LDC of the Future Survey

- The overwhelming majority of LDC execs say that their LDC is 'extremely well prepared to meet the challenges and opportunities of the future.'
- Most LDCs agree that innovation is their driving principle and that the 'LDCs of the future' will need to be high-tech and innovative.
- LDCs view several emerging technologies as being potentially transformational for the electricity distribution industry.
- With off-grid energy generation already in the crosshairs, LDCs also had strong opinions about different revenue models to turn to if customers choose to go off-grid.

LDCs are ready to embrace micro grids

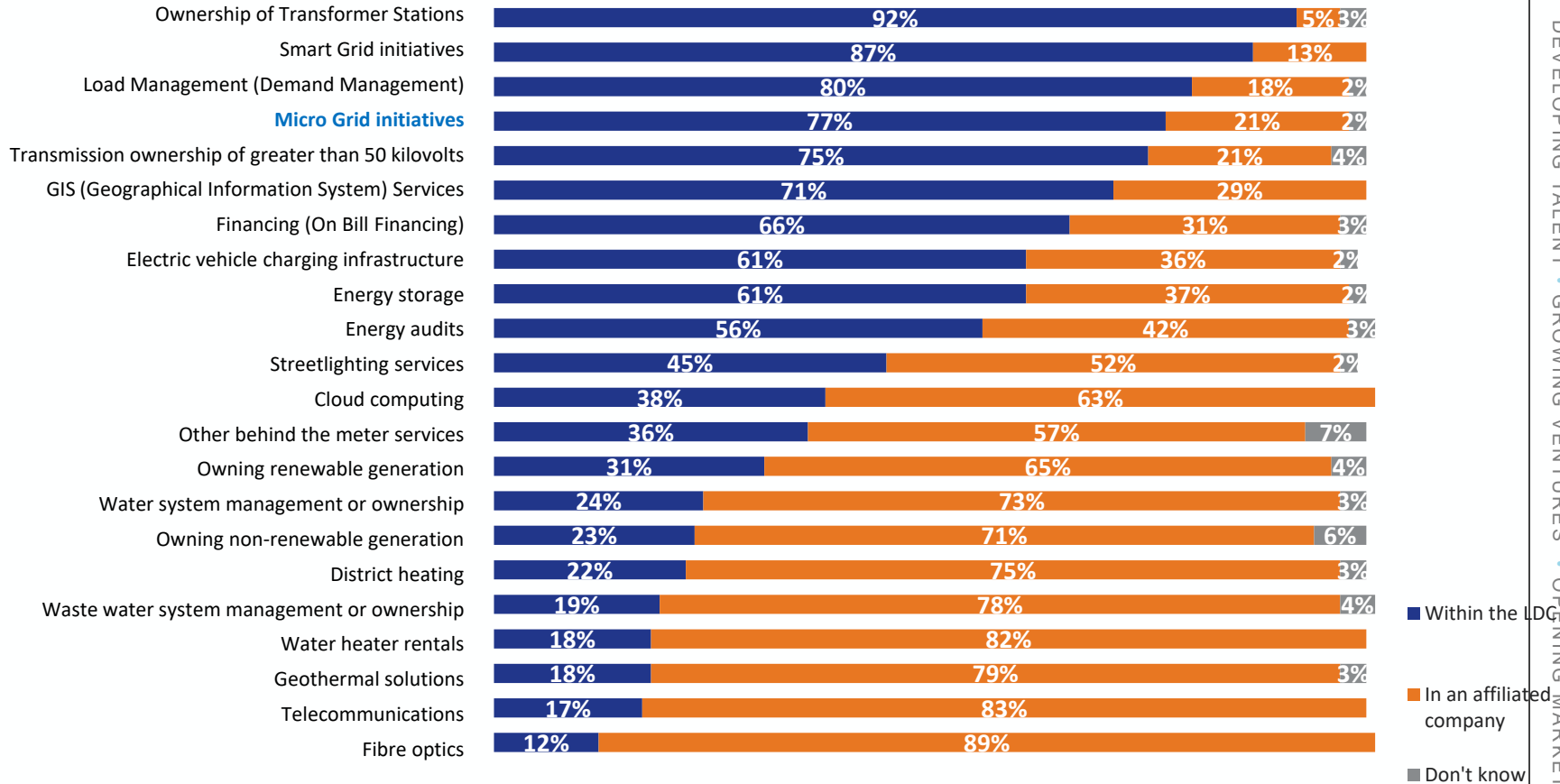
Unprompted, half of LDCs cited energy storage systems/batteries as a new and emerging technology that would be transformative for distributors. Nearly as many mention micro grids and other off-grid energy generation. Electric vehicles and the infrastructure for them round out the top three.



Source: EDA's LDC of the Future Survey, 2016



LDCs would prefer to keep micro grid initiatives within the utility



Source: EDA's LDC of the Future Survey, 2016

