

Toronto is Changing

Managing challenges while seizing opportunities

April 4, 2019 – Ontario Geothermal Association Conference



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Environment and Energy Division

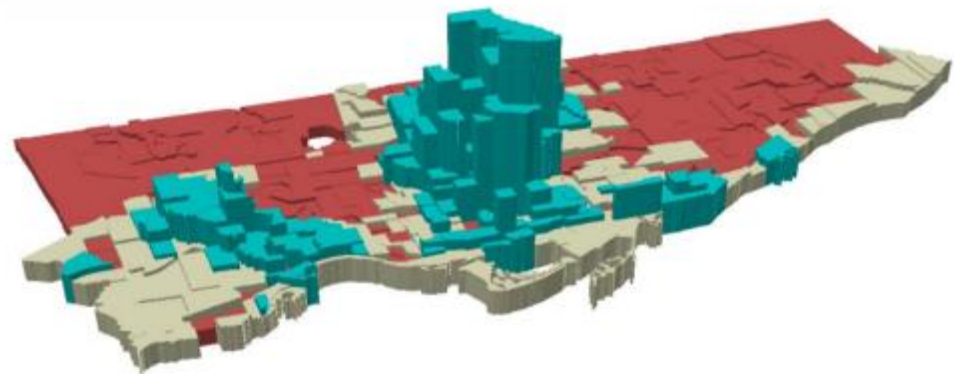
Toronto is Succeeding

- Rated one of the 10 most liveable cities in the world. (2018 Economist's Livability Survey)
- Ranked the most sustainable city in North America. (Sustainable Cities Index - 2015)
- Deemed the most resilient city in the world. (Resilient Cities: A Grosvenor Research Report - 2014)

• GHG emissions are 26% below 1990 levels despite economic growth & a population increase of over 500,000 people between 1991 and 2016

But . . .

- Toronto is one of the ten most traffic congested cities in North America.
- Toronto's income inequality has grown by 31% in the last 25 years.
- Toronto's youth unemployment rate is around 20%.
- Toronto is challenged to maintain a state of good repair for its roads, transit, social housing, parks and water/wastewater systems & other services while also accommodating growth.



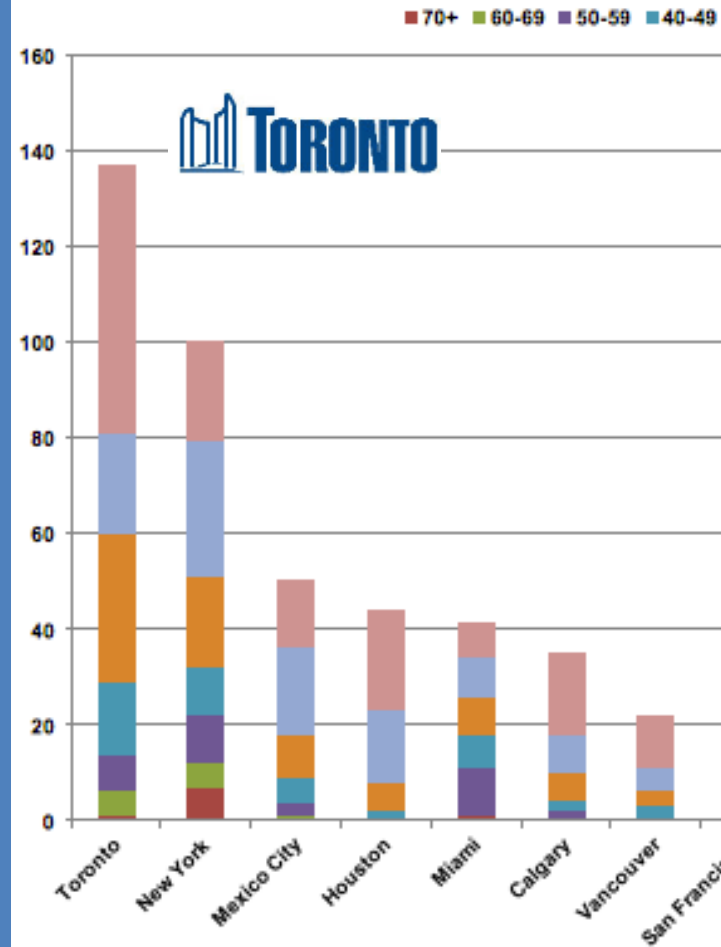
Low Income Middle Income: 20% above or below the Toronto CMA average for the stated year. High Income

RAPID GROWTH

Creates Opportunities & Challenges

- **Toronto's** population is estimated to grow by **31% by 2041** to **3.6 million**
- The Greater Toronto Area is expected to reach 9.4 million by 2041
- Increasing density and intensification
- Adds considerable pressure on all forms of infrastructure
- Creates opportunity to change the urban structure and form

High Rise Construction in North American Cities, March 2015

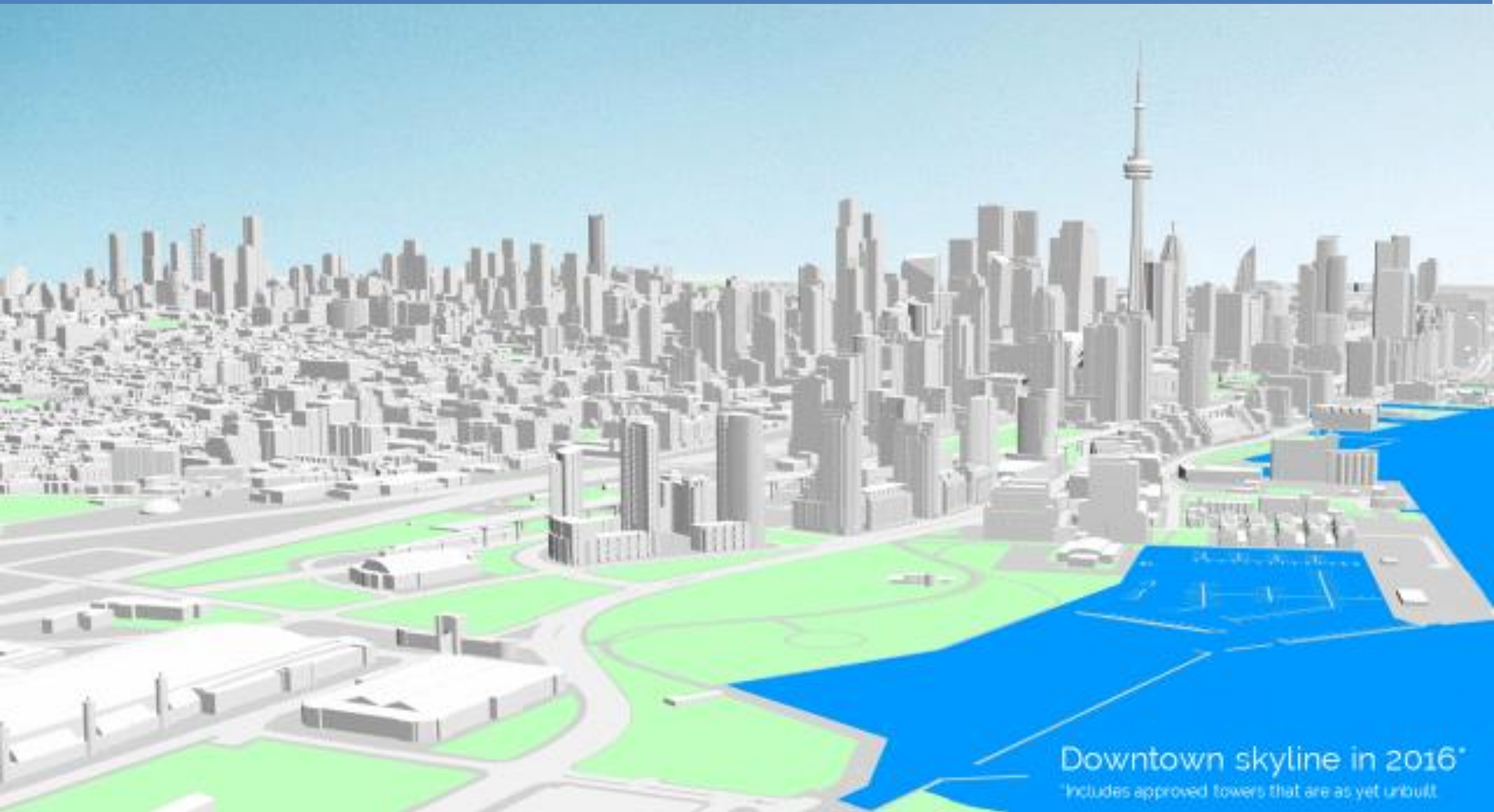


Source : www.skyscraperpage.com - Updated March 12, 2015



Densification and Urbanization

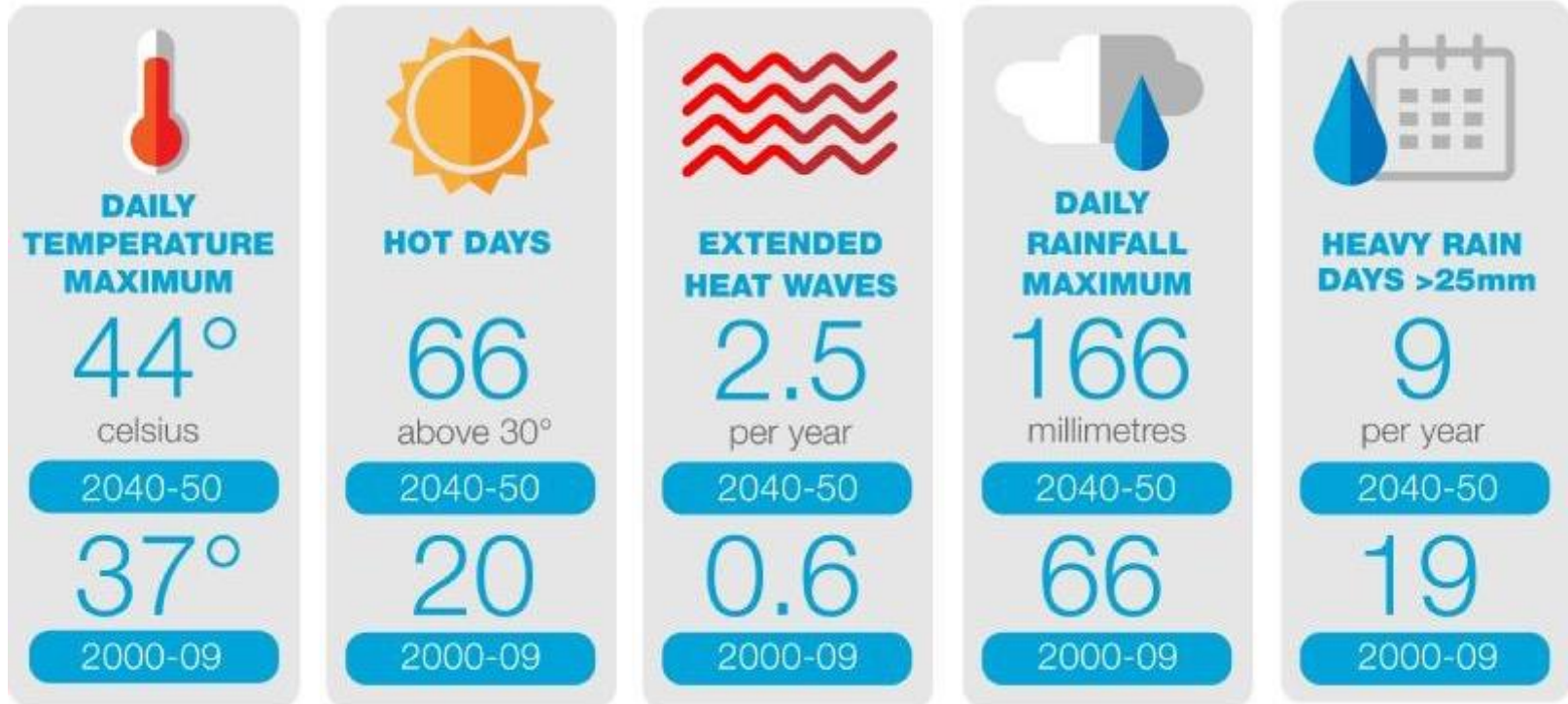
A Changing Skyline 2005 to 2016



Downtown skyline in 2016*

*Includes approved towers that are as yet unbuilt.

Toronto's Future Weather: Wetter, Warmer & Wilder.



*Source: Toronto's Climate Driver Study, 2011

Toronto's Future Weather: wetter, warmer & wilder

Source: Toronto's Future Weather & Climate Report adopted by City Council in early 2013

Extreme Heat

- higher maximum daily temperatures
- more days with $> 30^{\circ}\text{C}$
- more heat waves (3 consecutive days $> 32^{\circ}\text{C}$)



by 2040 expect 6 times more A/C use (days $> 24^{\circ}\text{C}$)

Summer Flood: 300,000 residents affected. Multi-day power outage.

Winter Ice Storm: 650,000 residents affected. Multi-day power outage

“no water, no heat”

“by the 2nd day many residents started leaving”

“had to close shop. substantial amount of merchandise spoiled”



“emergency generator failed to start”

“generator repairman couldn’t get to us”

“could not get diesel fuel in time”

What will low-carbon Toronto look like in the future?



Homes and buildings generate about half of the greenhouse gas emissions in Toronto today.

- By 2030, **new buildings** will be built to produce **near-zero greenhouse gas (GHG) emissions**
- By 2050, all **existing buildings** will have been retrofitted to **improve energy performance an average of 40%**.

Energy:

- By 2050, **75% of the energy** we use will be **renewable or low-carbon**;
- By 2050, **30% of total floor space** across Toronto will be **connected to low-carbon heating and cooling energy**.

Transportation: vehicles generate about one-third of the greenhouse gas emissions in Toronto today.

- By 2050, **100% of vehicles** in Toronto will **use low-carbon energy**;
- By 2050, **75% of trips under 5 km will be walked or cycled**.

Waste Diversion:

- By 2050, 95% of waste will be diverted from landfills. Waste generates more than 10% of the greenhouse gas emissions in Toronto.

Large magnitude emission reductions:



Three Key Strategies

3. Efficient Buildings + Low-carbon/Renewable Thermal Energy

reduce/displace natural gas use in buildings.

2. Circular Economy

minimize waste to landfill + capture methane

1. Modal shift + Transit + Electric Mobility

to reduce/displace mobile fossil fuels.



Rivian HQ Plymouth MI (Magna tech)

a better pick up that happens to be electric



Electric trucks ?



Role of (LEVs) Light Electric Vehicles/mobility ?



Roles for the City: Net Zero Development

- Policy / Regulator/ Master planner
- Facilitator / Enabler
- Supplier of renewable energy from municipal operations/assets (i.e. sewer heat, bio gas, heat recovery, urban wood, underutilized land for geothermal)
- Leading by example: City owned land/buildings

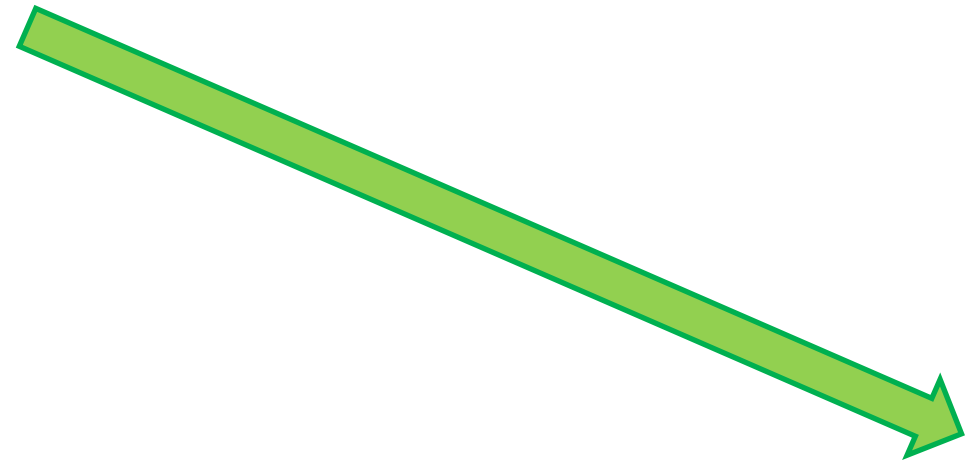
Note: role(s) may change with specific opportunity/project.

Policy: Integration with land-use

Toronto has now **integrated energy, emissions, and resilience considerations into the land-use process**, at every stage.

Land-use	Energy, Emissions & Resilience
Official Plan (city-wide) OPA 262	Energy, emissions, and resilience policies
Area Plans	Community Energy Plans
Rezoning development applications	Energy strategy requirement
Site plan development applications	Toronto Green development Standard (TGS). TGS Version 3 has carbon targets effective May 1, 2018

Policy: Path to Zero by 2030



2018	2022	2026	2030
V3 Tier 1	--	--	--
V3 Tier 2	➤ V4 Tier 1	--	--
V3 Tier 3	V4 Tier 2	➤ V5 Tier 1	--
V3 Tier 4	V4 Tier 3	V5 Tier 2	➤ V6 Tier 1

Renewable Thermal Energy

Master Plans: Port Lands Net-zero Energy

Port Lands Energy Plan

Guidelines for a Net Zero District



For comments or questions, please contact:

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September 2017

 **Toronto** Environment and Energy Division

Potential for new development in the order of 20 Million sqft (gross floor area) of residential and commercial buildings (mixed-use).

18,000 to 25,000 residents

25,000 to 30,000 employees.

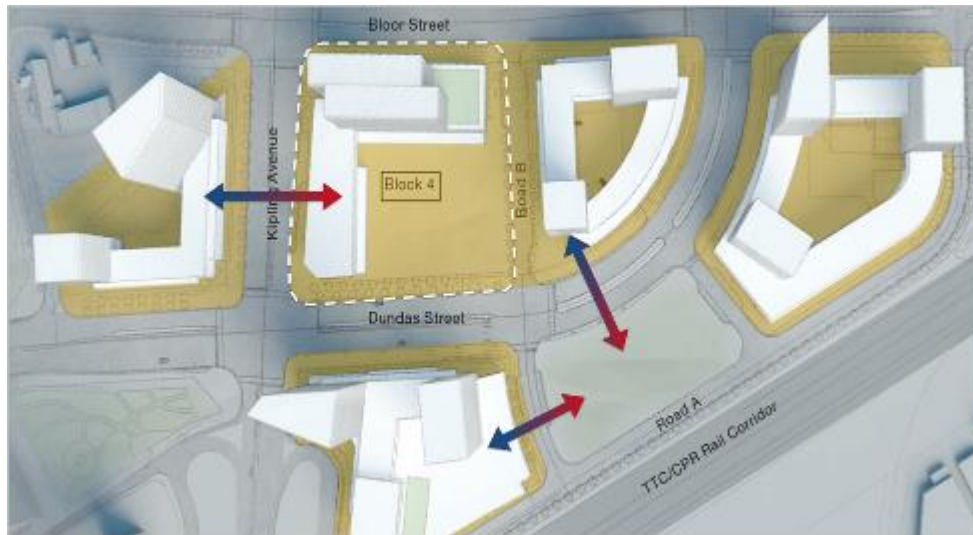
Adopted by City Council in 2017

Guidelines for a Net Zero District, include:

- Super efficient buildings
- Transit oriented development
- Low-carbon/renewable thermal energy networks:
 - Heat pumps coupled with: ground/sewers/lake/sun

Leading by example: New Net-Zero Community: Toronto

City owned brownfield. Three million sqft of mixed-use development. New Civic Centre. Unique opportunity for net-zero community: **low-carbon thermal energy network + efficient buildings**



Low-Carbon Thermal Energy Network

Installation of the energy distribution pipes underway as part of new road network construction.

Leverage large-scale renewable energy sources can cost-effectively provide the majority of low-carbon energy use, including: geo-exchange, sewer heat recovery, thermal energy storage, solar thermal, thermal energy sharing/distribution.



Super Efficient Buildings

Passive design + high performance systems for significant reduction in energy use, to be supplied by a low-carbon/renewable thermal energy network.

City will lead by example with a very high performance Civic Centre development, connected to the low-carbon thermal energy network.

Former Lakeview coal power plant: Mississauga



Plan for Net-Zero Lakeview village: Mississauga



??? ALIGNMENT ??? for a LOW CARBON FUTURE



Business/institutions

Green Industry

Communities

Municipalities in Ontario

Federal Government

Province of Ontario

WHO SPEAKS FOR CLIMATE ACTION?



Don't fight forces, use them.

*We are called to be the architects of the future,
not its victims.*

Buckminster Fuller



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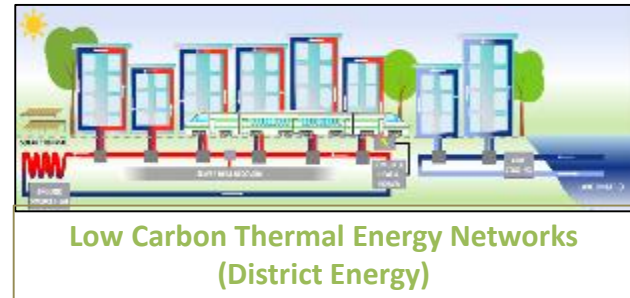
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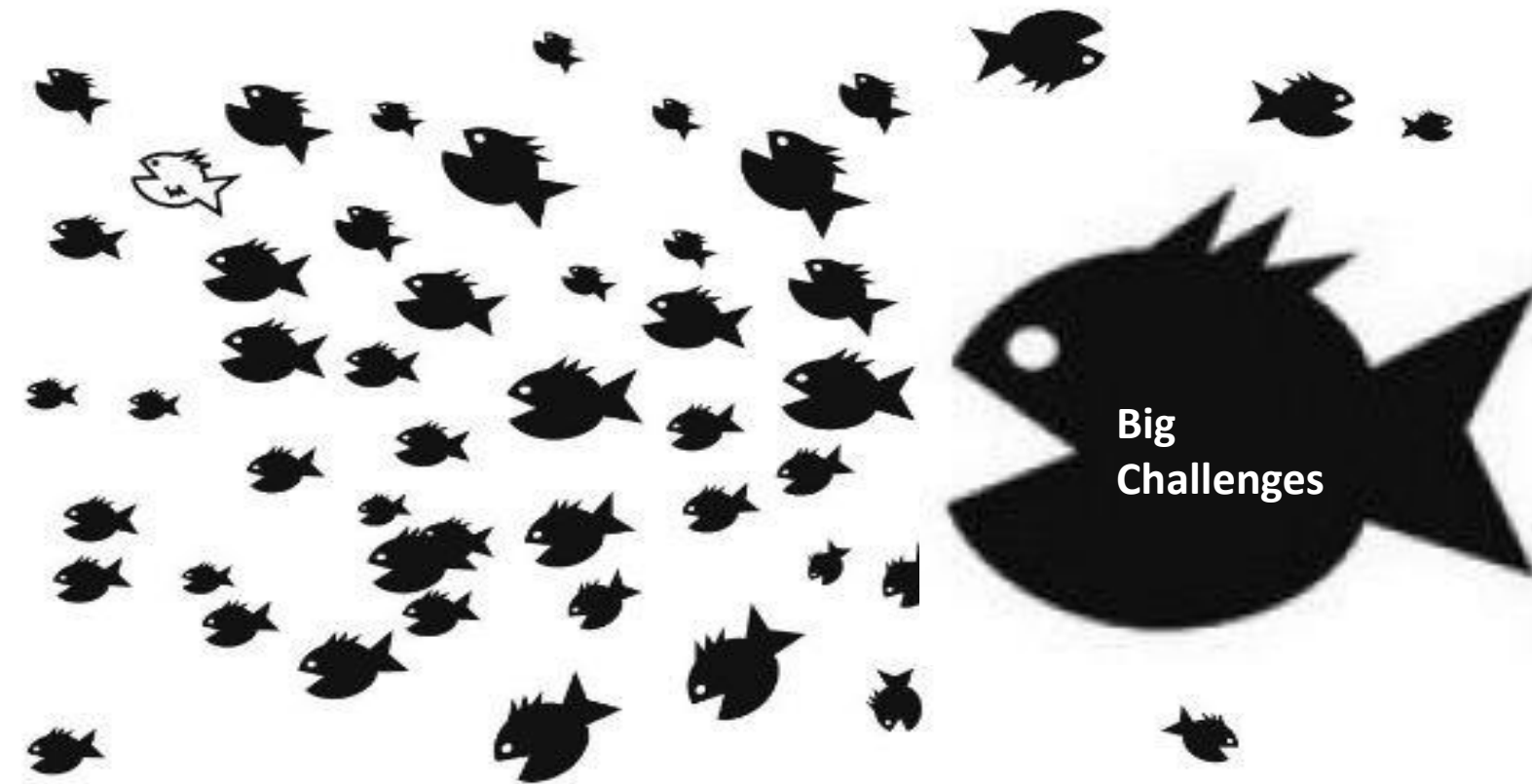
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Uncoordinated Action



Coordinated Action

