

Zero Emissions Development by 2030

Transforming the market: Policy, Bus Model, Bus Case

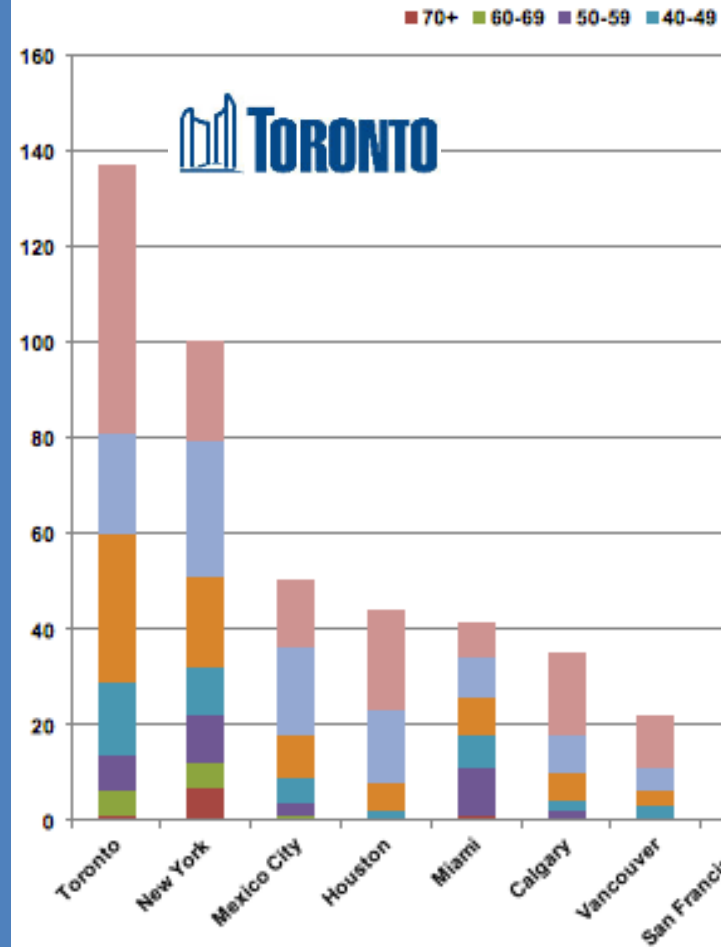


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RAPID GROWTH Creates Opportunities & Challenges

- 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

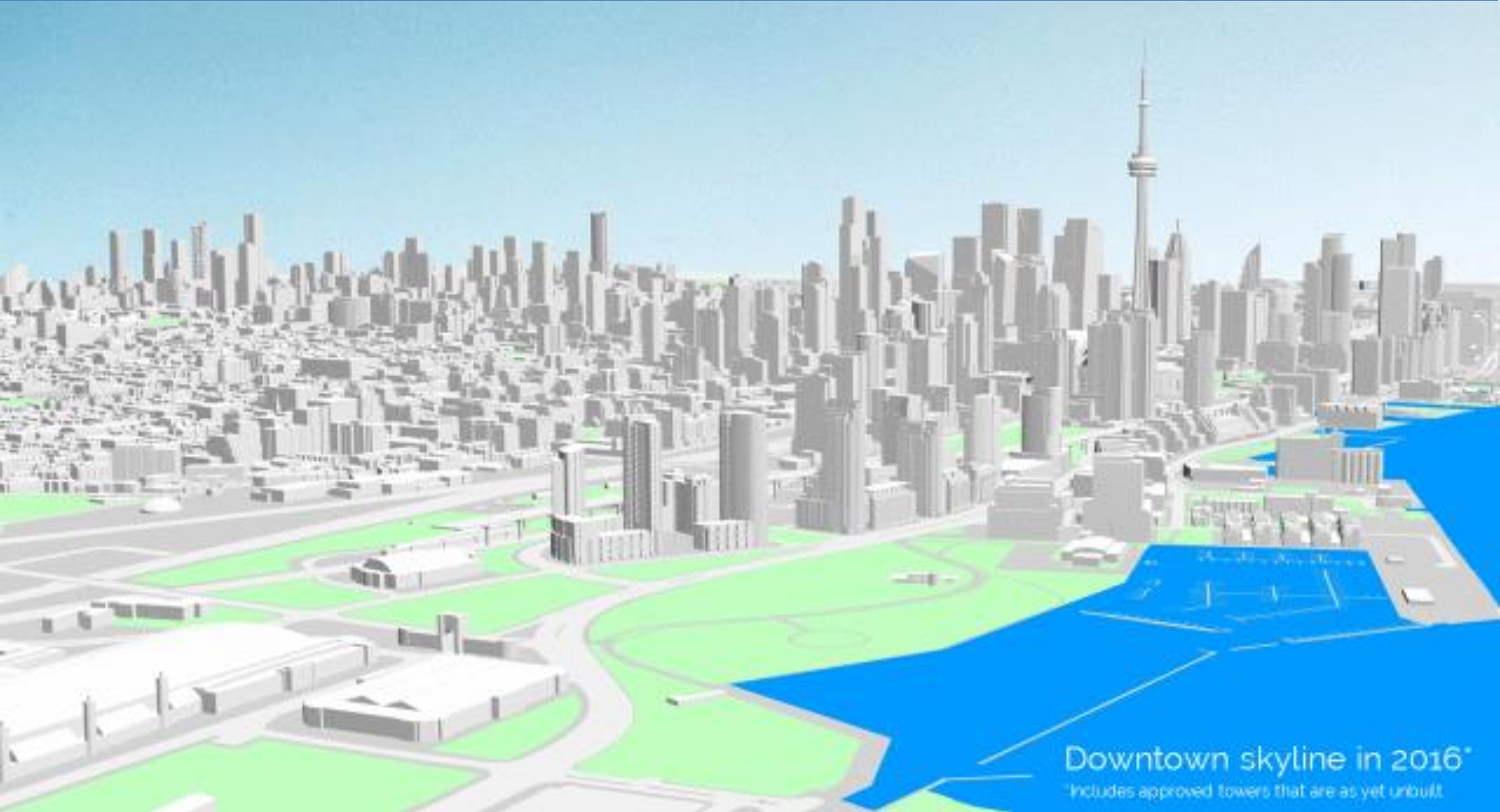
High Rise Construction in North American Cities, March 2015



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

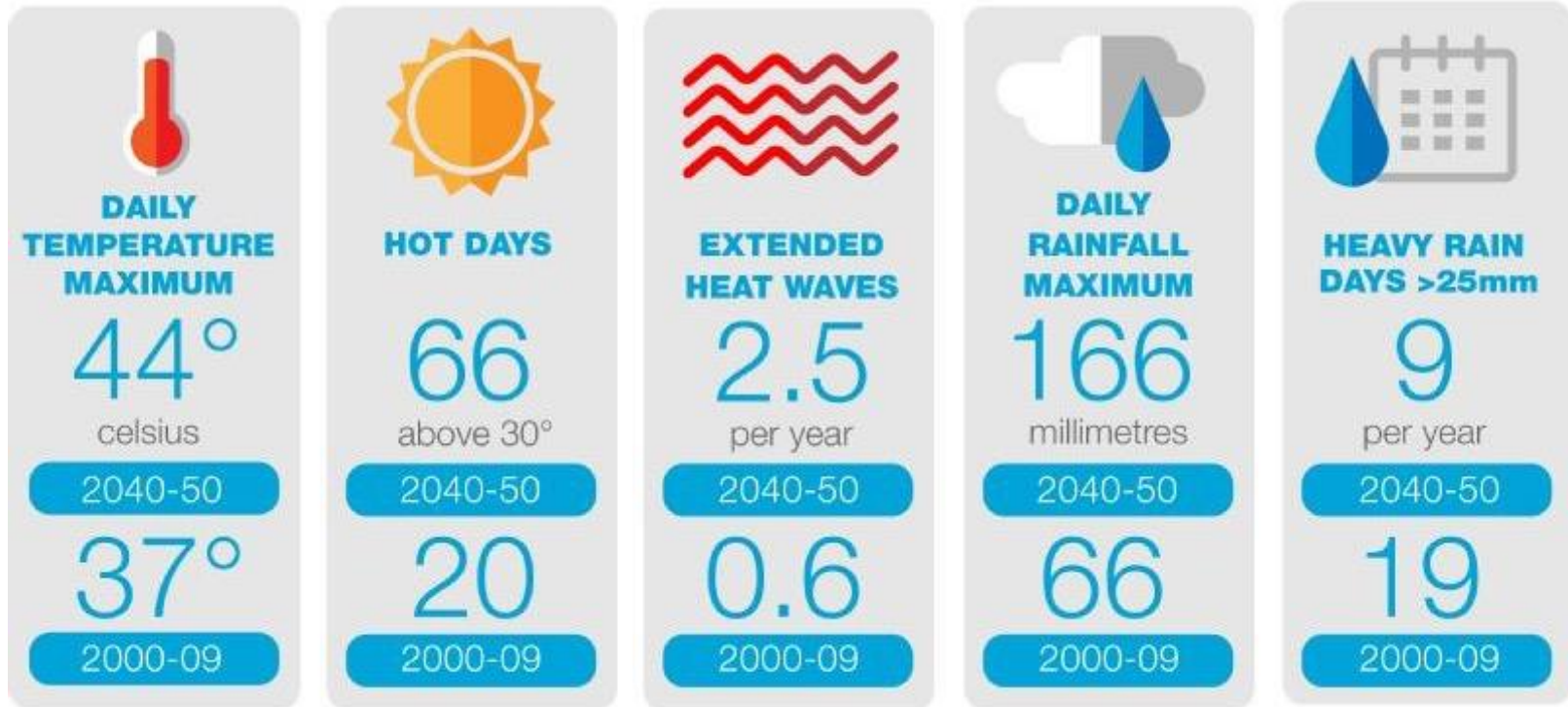


Densification and Urbanization A Changing Skyline 2005 to 2016



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 $> 30\text{ C}$
- more heat waves (3 consecutive days $> 32\text{ C}$)



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

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”

“could not get diesel fuel in time”

“generator repairman couldn’t get to us”

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.

TransformTO Long-Term Goals

Toronto's GHG reduction targets, based on 1990 levels:

↓ 30% by 2020


↓ 65% 2030


↓ 80% by 2050

How we'll get there:

100% 
of new buildings are near
zero GHG emissions by 2030

100% 
of existing buildings are
retrofitted by 2050

75% 
of energy comes from renewable
or low-carbon sources by 2050

30% 
of total floor space uses
low-carbon thermal energy
by 2050

100% 
of transportation uses low
or zero carbon energy by 2050

75% 
of trips under 5km are
walked or biked by 2050

95% 
of waste is diverted
in all sectors by 2050

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

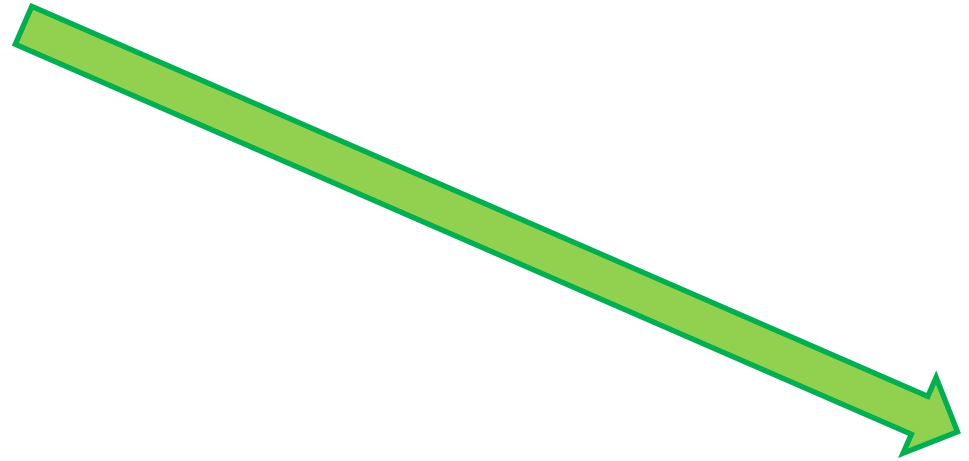
Note: role(s) may change with specific opportunity/project.

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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 **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.

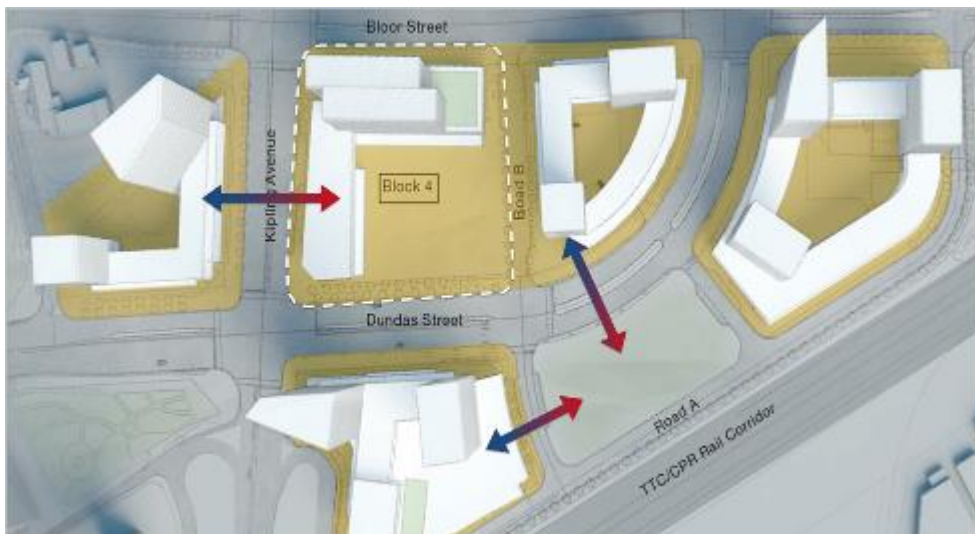
Adopted by City Council in 2017

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.

Market Transformation Cycle -> Zero Emission Development

Policy/requirements:

TransformTO climate action plan

- Net Zero Development by 2030

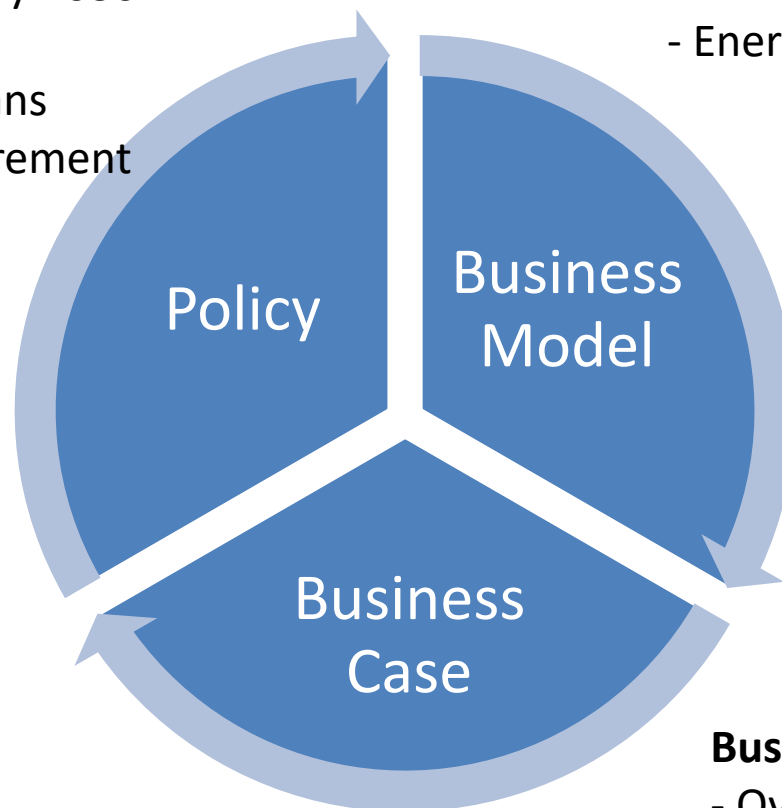
Official Plan policies

- Community Energy Plans
- Energy Strategy Requirement
- Green Standard

Business Model:

Partnership to deliver better envelopes and renewable energy

- Energy Developers



Business Case:

- Overall value proposition
- Brand/reputation
- It's coming. Required in 2030

Former Lakeview coal power plant: Mississauga



Plan for Net-Zero Lakeview village: Mississauga



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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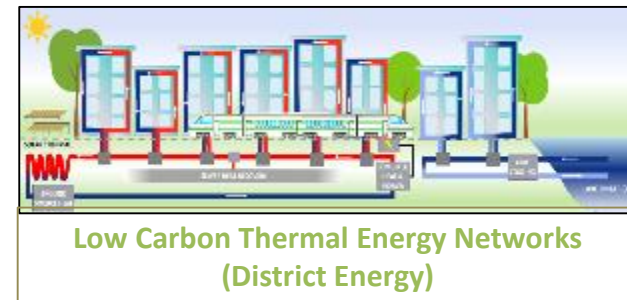
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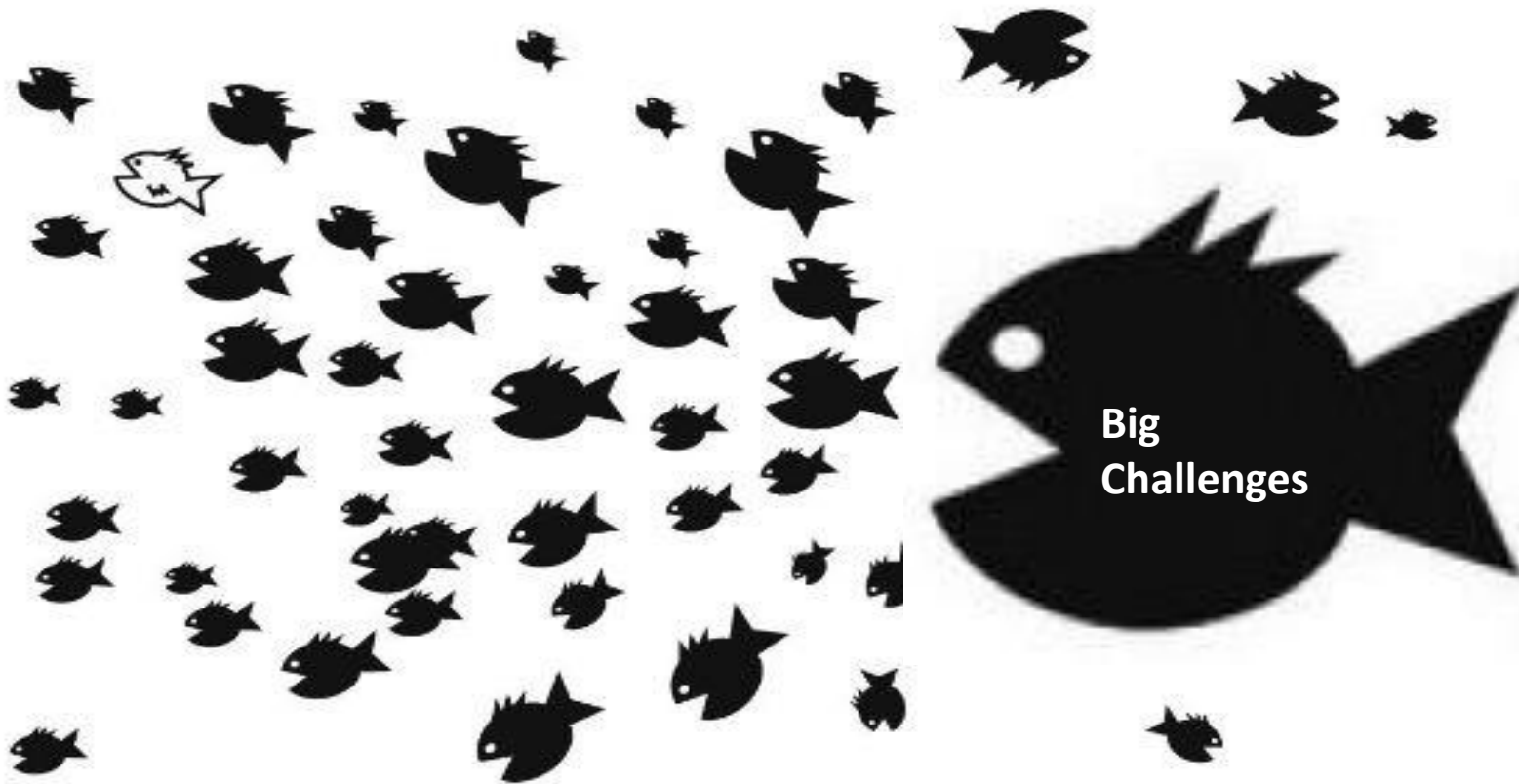
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Uncoordinated Action



Coordinated Action

