

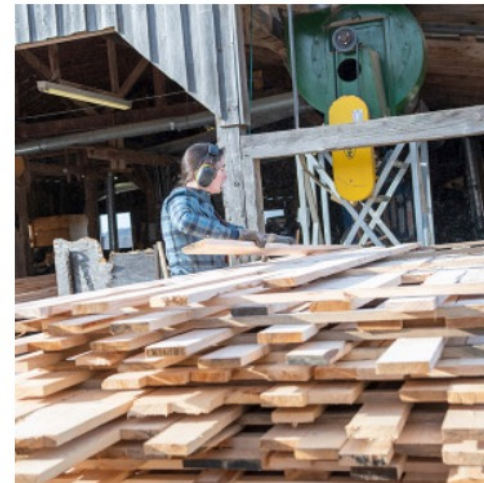


# Vermont Forest Future Future Think-Tank

## PART 1

### Forces of change

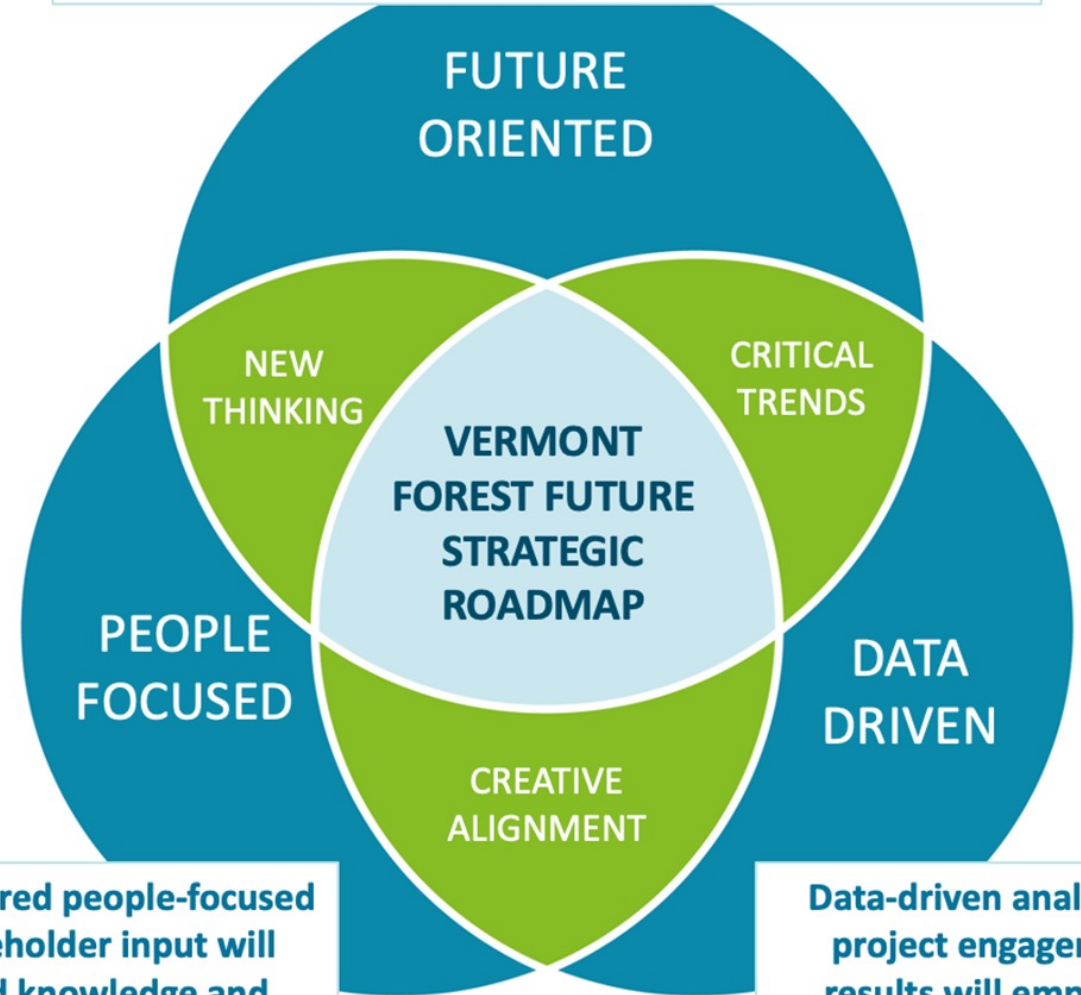
## Think-Tank Part 1



The Vermont Forest Future Strategic Roadmap will identify **actionable strategies** to strengthen, modernize, promote, and protect Vermont's forest products sector and the broader forest economy.



What is the future of Vermont's forest economy? This project will examine critical emerging trends in forested areas nationwide to create an understanding of local implications and opportunities.



Structured people-focused stakeholder input will build knowledge and strengthen the statewide forest economy.

Data-driven analysis of project engagement results will empower leadership to make research-based decisions.

# Vermont Forest Future

## Strategic Roadmap Development

### STEP 1

#### Explore Perceptions

- Review research
- Industry Roundtables
- Stakeholder Survey #1
- Interviews

**Current Conditions  
Report**

November – January

### STEP 2

#### Future Scenarios and Implications

- Future Think Tanks
- Vision workshops
- Stakeholder survey #2
- Identify Preferred Future

**Scenarios of the  
Future Report**

December - March

### STEP 3

#### Develop Draft Strategic Roadmap

- Build strategic framework
- Identify key themes
- Focus Groups
- Draft Recommendations

**Draft Recommendations  
Report**

April – May

### STEP 4

#### Forest Future Strategic Roadmap

- Future Summits

**Final Roadmap  
Report**

June - November





# Vermont Forest Future - Think-Tank process

## Part 1 – Forces of change

- Macro trends shaping the future
- Identify key drives shaping the future of the VT forest economy
- Rating future impact of drivers

## Part 2 – Future Scenarios

- Develop plausible scenarios of the future
- Examine implications
- Identify expected and preferred futures
- Begin identifying strategic pillars



Dec 13  
2022

Jan 31  
2023





# The Importance of Future Thinking



# The key to effective future thinking...

- Explore and anticipate a range of plausible futures.
- Consider both **trajectory** (direction of change) and **velocity** (speed of change).
- Explore the combined impacts of multiple potential trends.

Explore potential 'shape and contours' of the future.







## The challenge for the Think-Tank

- Explore the future -
- Ask the hard questions -
- Think creatively -

The outcome may be a new view of the future.



# In a time of change and uncertainty....

- Which trends are being amplified and accelerated?
- What changes might be more elastic?
- Where are the potential tipping points?







Forces impacting the  
world, regions and  
people

What are the emerging  
macro drivers...

# Macro Trends and Forces of Change Related to . . .

- Demographics, population and mass urbanization
- Energy, food, water & climate change
- Technology driving change





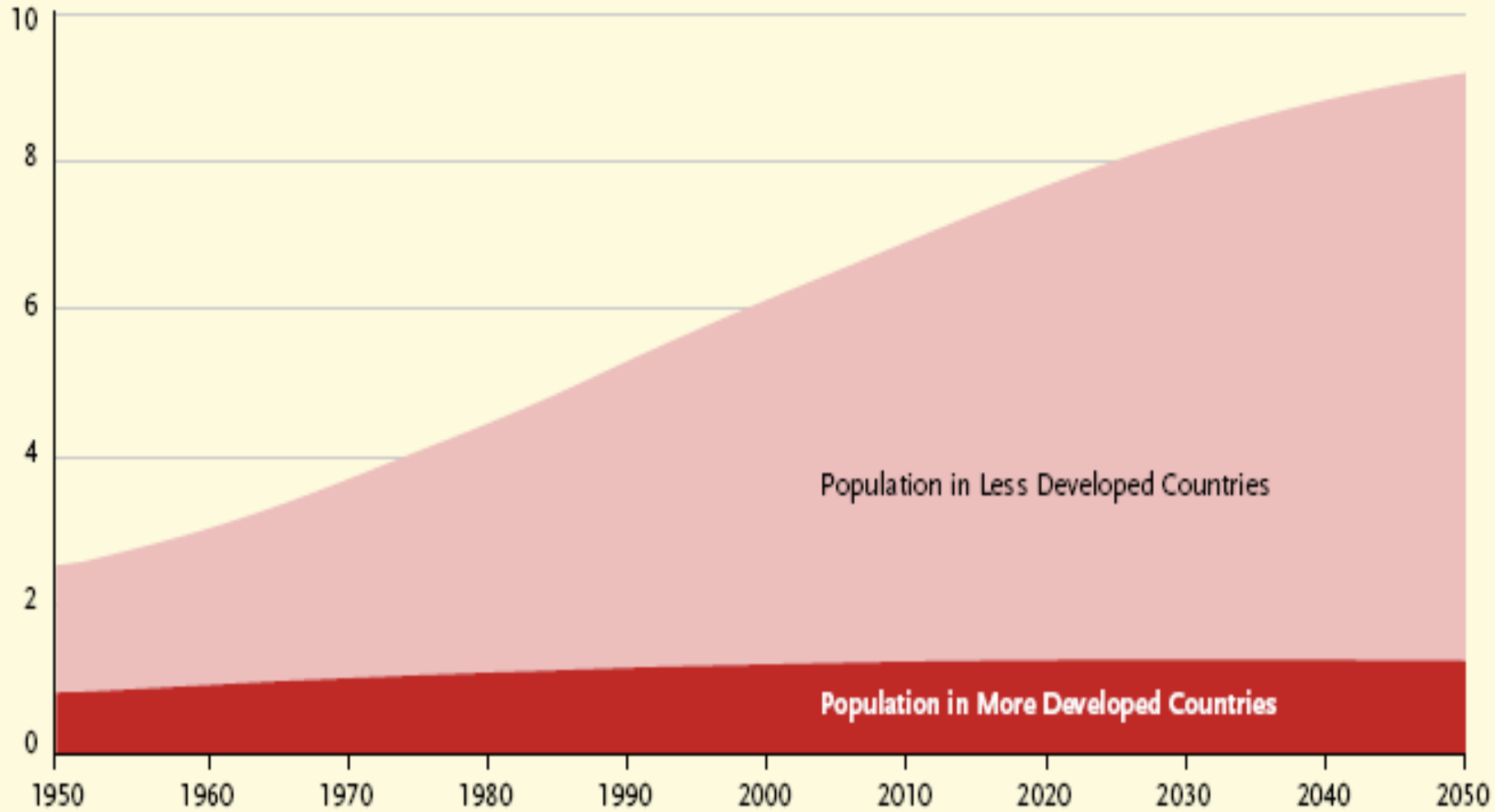


# Demographics, population and mass urbanization

future→iQ

## Global Population Growth Is Driven By Developing Countries.

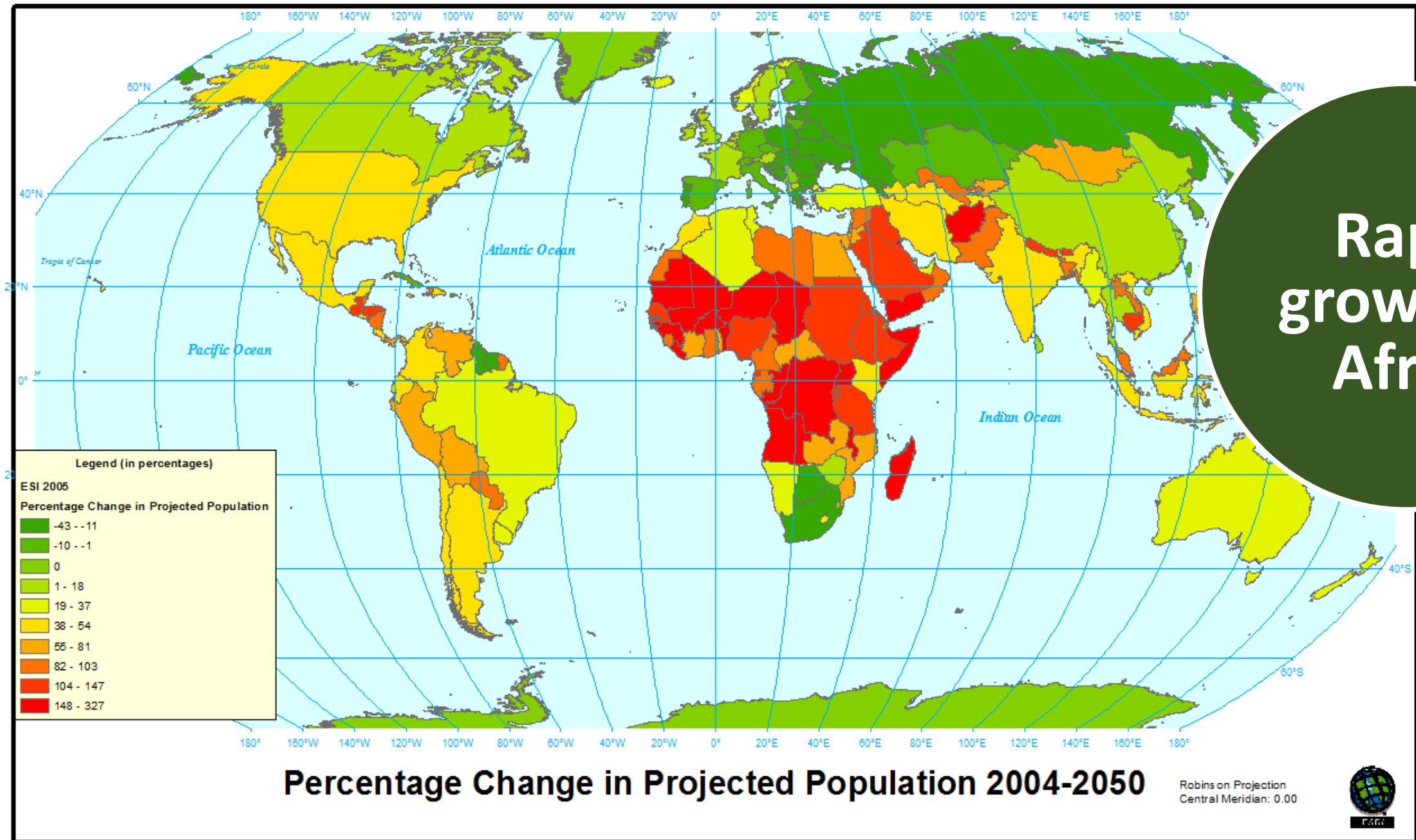
World population in billions, 1950-2050 (projected)



**Global  
population**

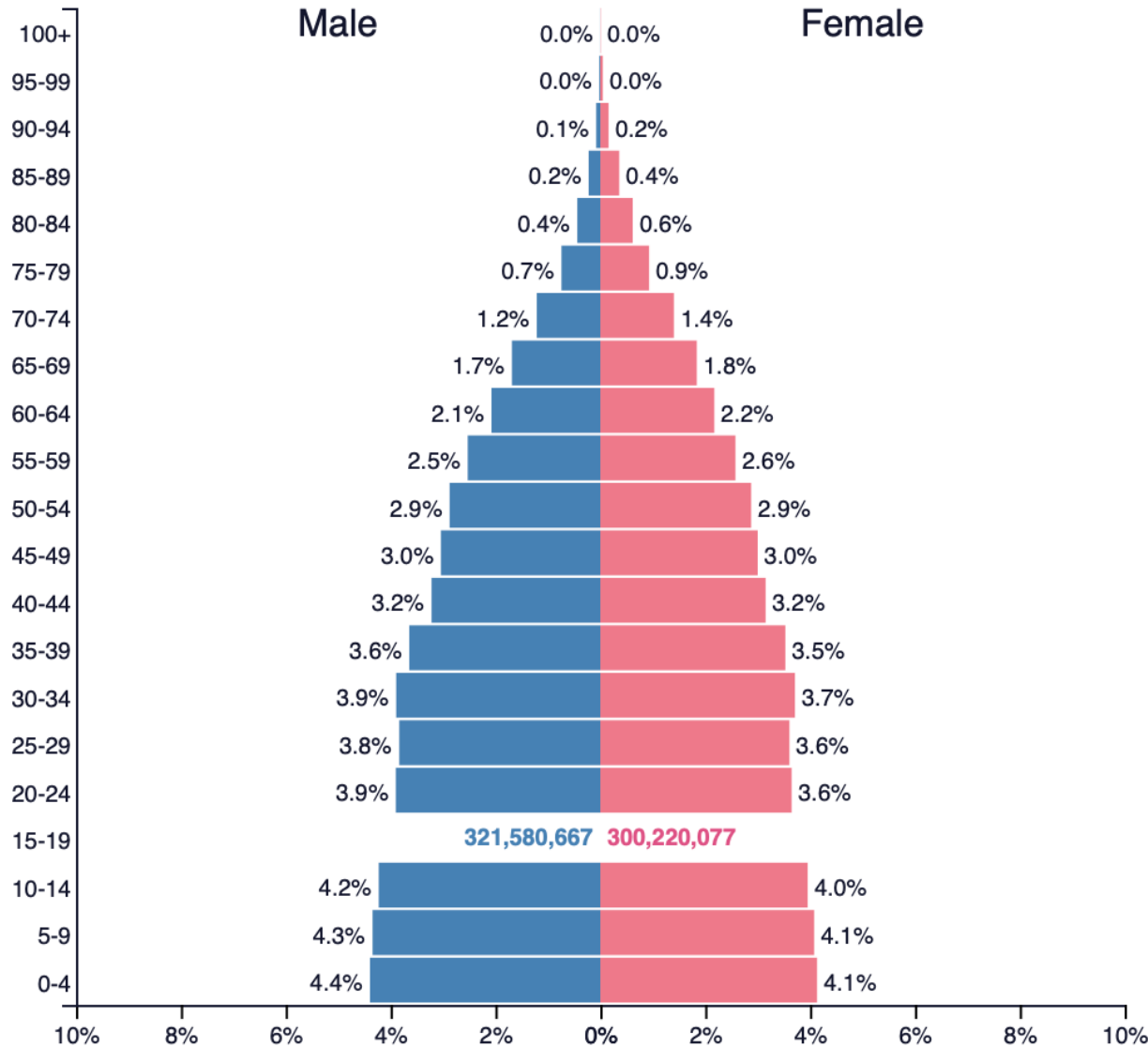
SOURCE: United Nations, *World Population Prospects*.





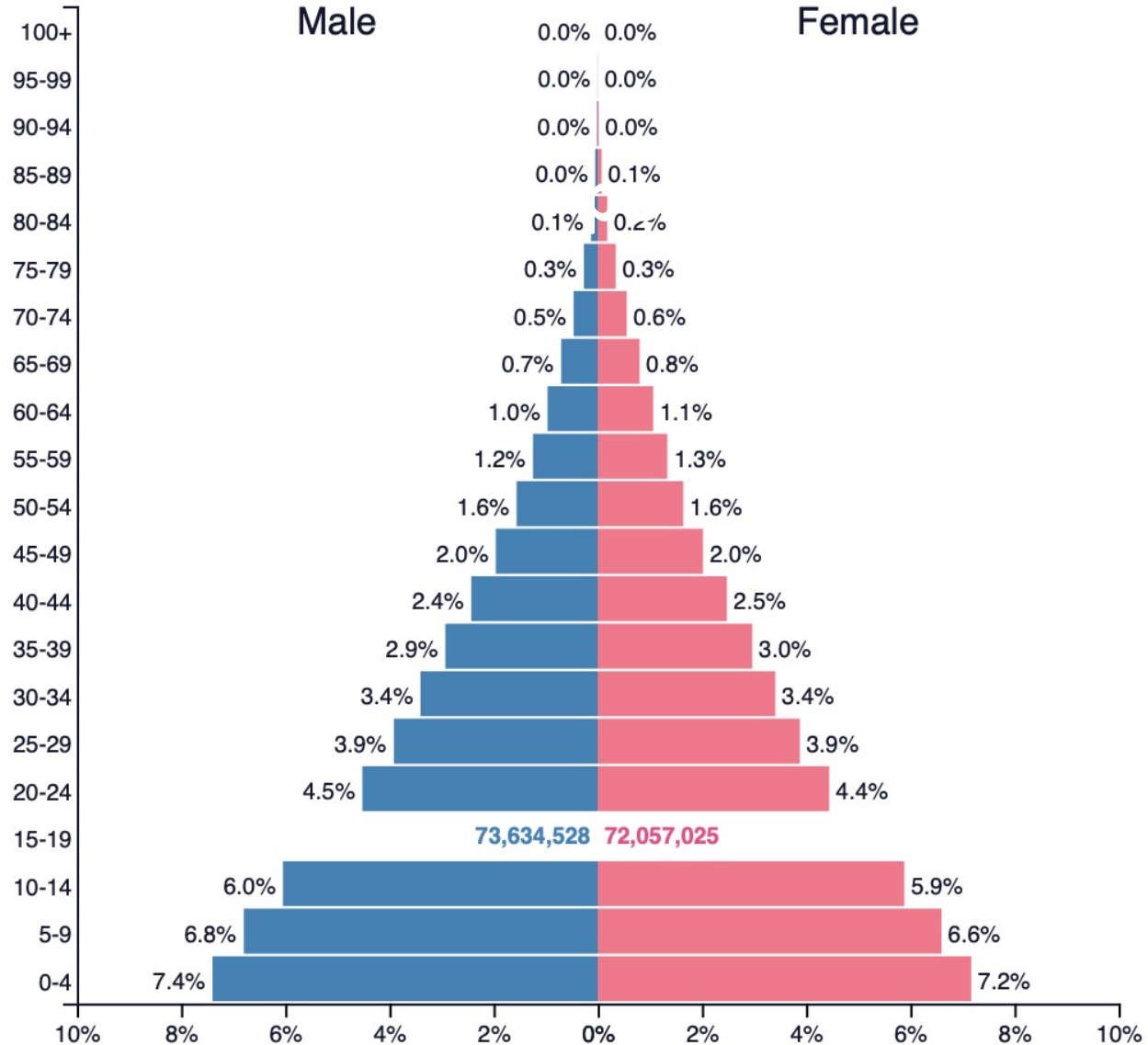
# WORLD ▼ 2022

Population: 7,953,952,576



# AFRICA ▼ 2022

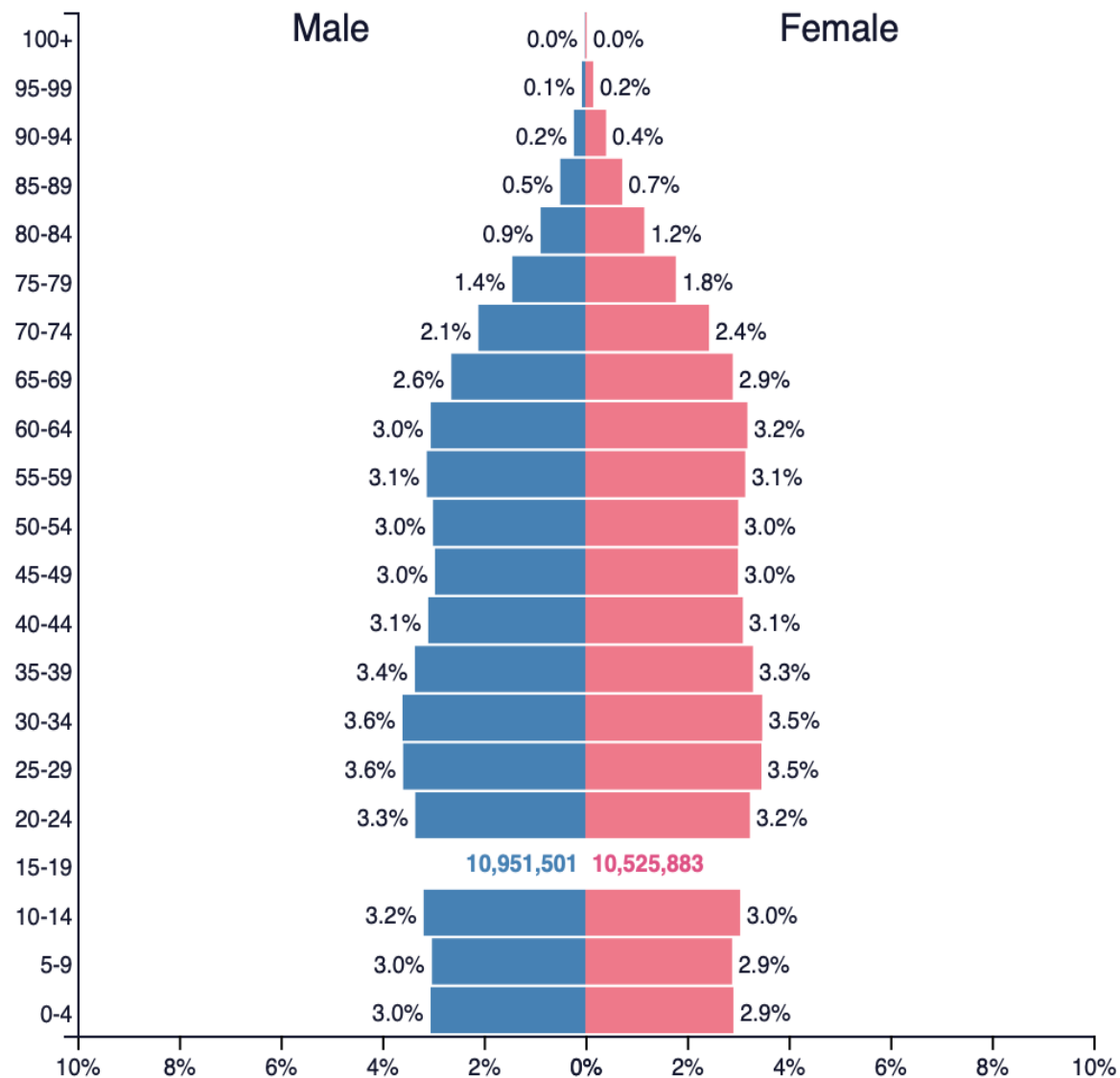
Population: 1,406,728,760



# United States of America ▼

## 2022

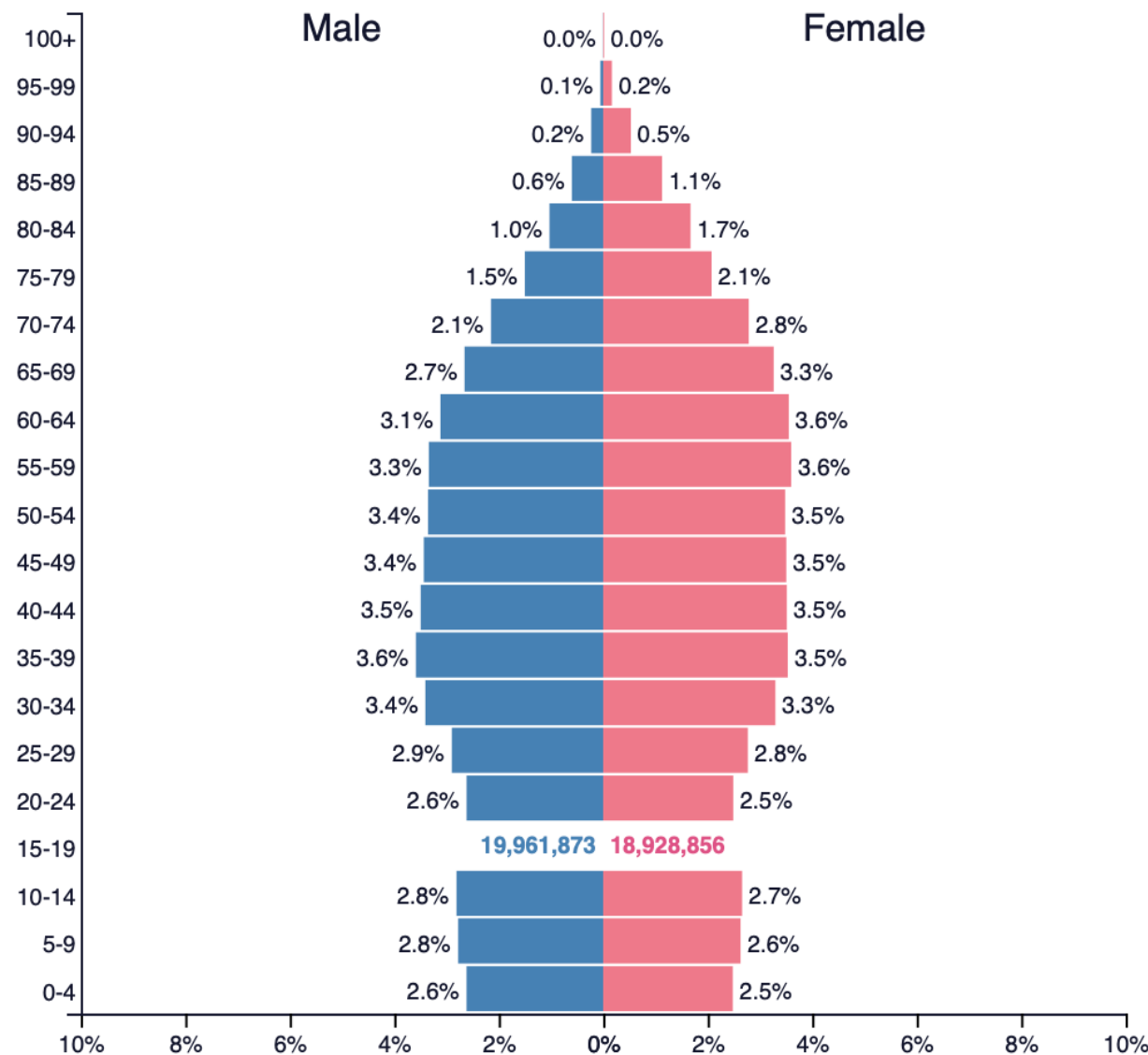
Population: 334,805,268



# EUROPE ▼

## 2022

Population: 747,543,827





# AN URBAN WORLD

This graphic depicts countries and territories with 2050 urban populations exceeding 100,000. Circles are scaled in proportion to urban population size. Hover over a country to see how urban it is (percentage of people living in cities and towns) and the size of its urban population (in millions).

## Urban Population

- Greater than 75%
- 50% - 75%
- 25% - 50%
- Less than 25%



1950



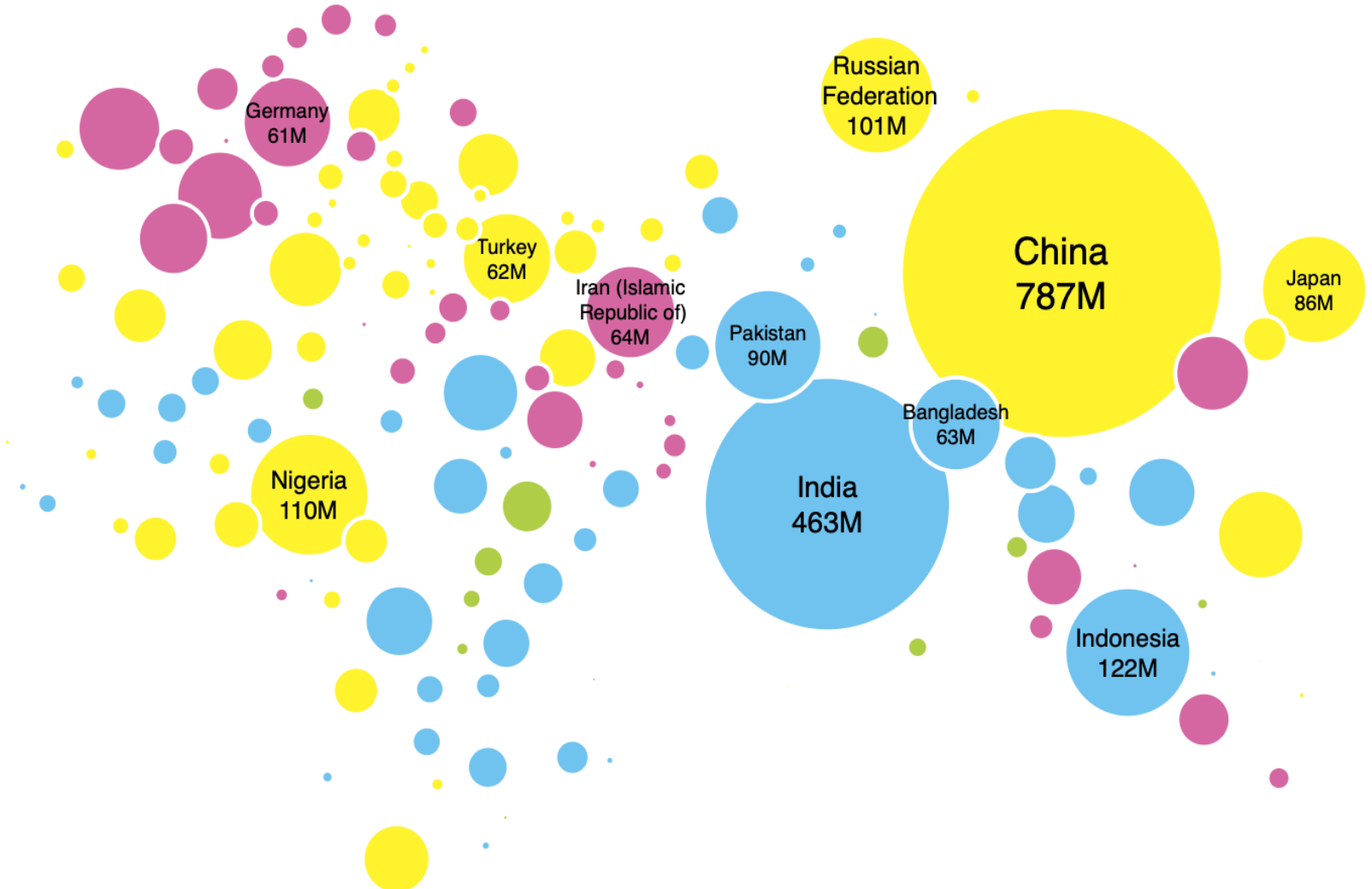
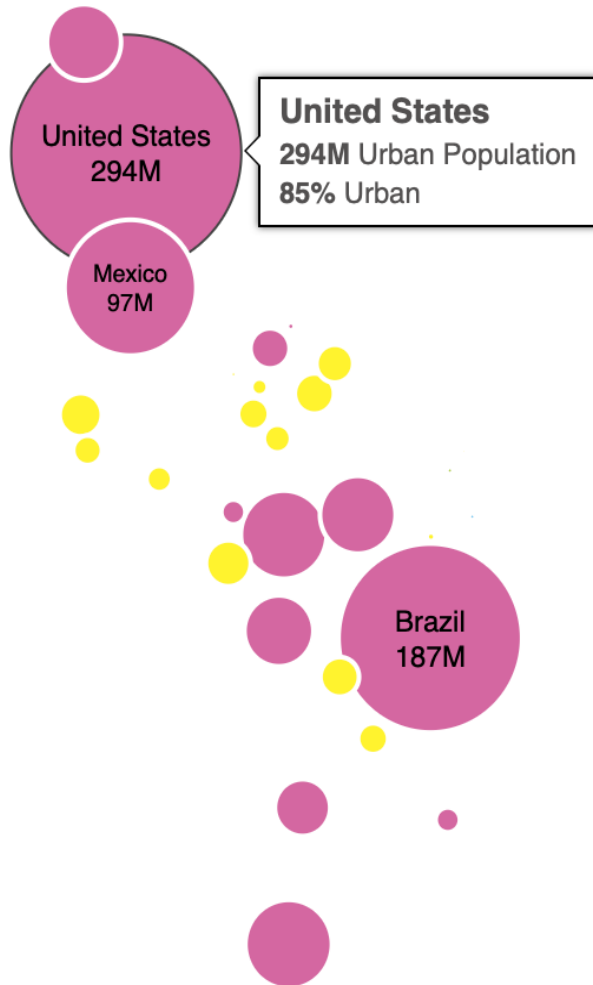
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## Urban Population

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- 50% - 75%
- 25% - 50%
- Less than 25%

2020



# AN URBAN WORLD

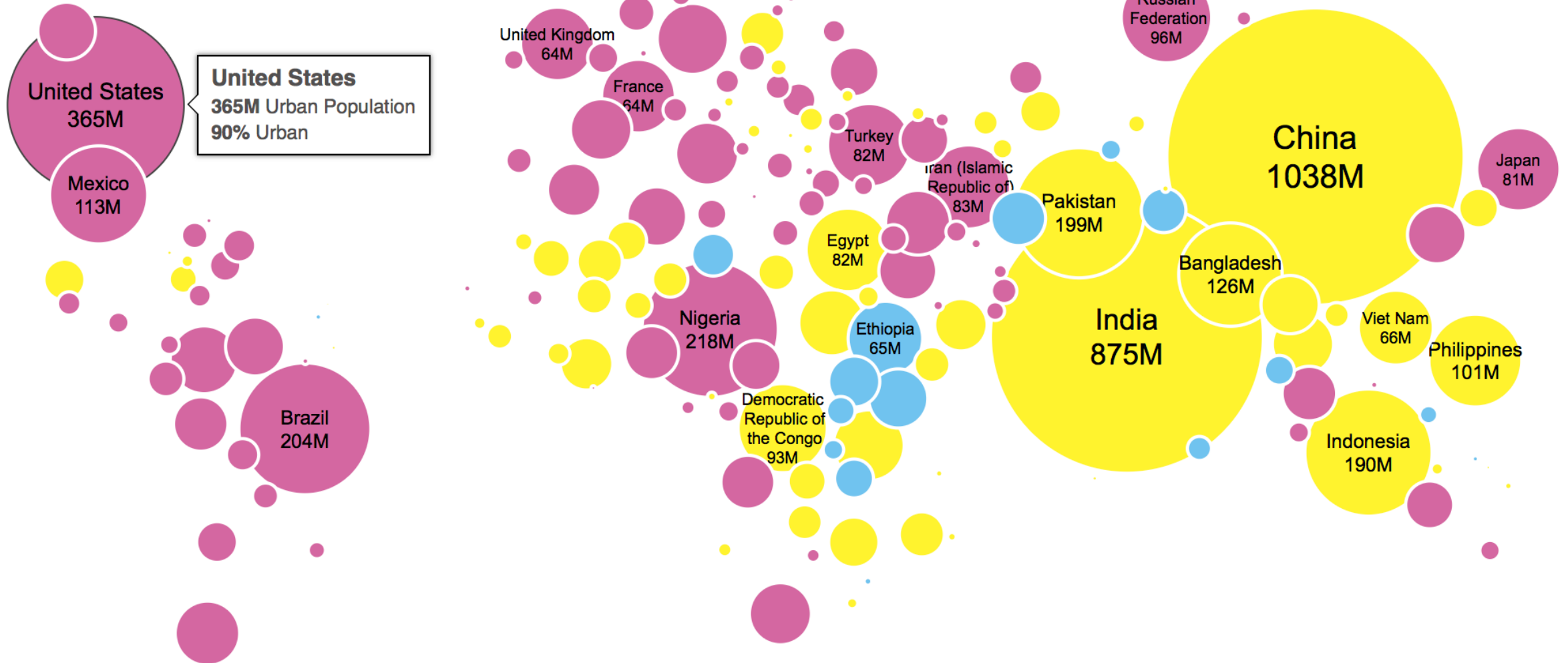
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## Urban Population

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2050

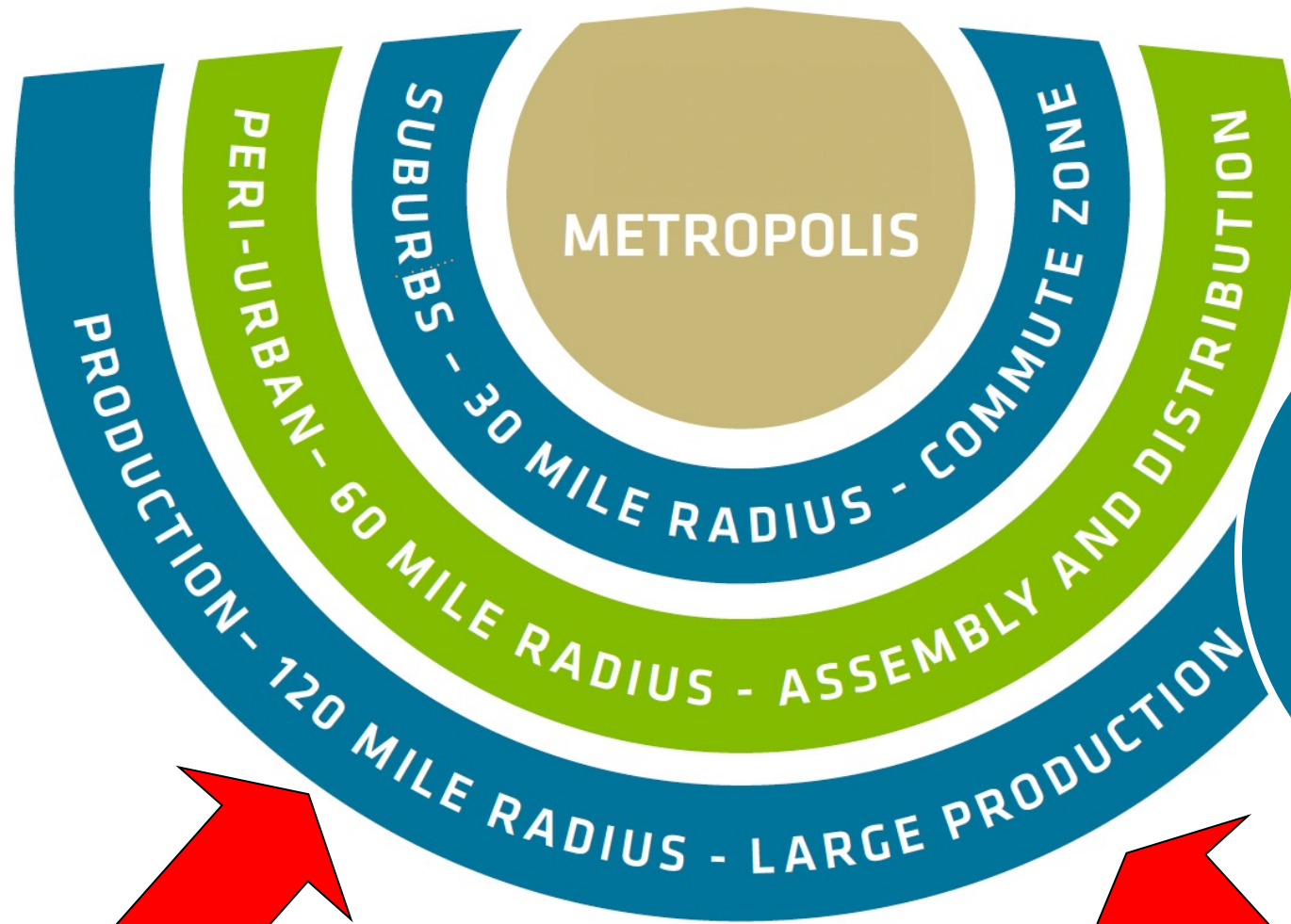




## Arc of Innovation



Future-Splitting  
Questions™



Driving change  
and innovation in  
lifestyles

**Society is re-distributing into mega-cities and specialized regional centers**

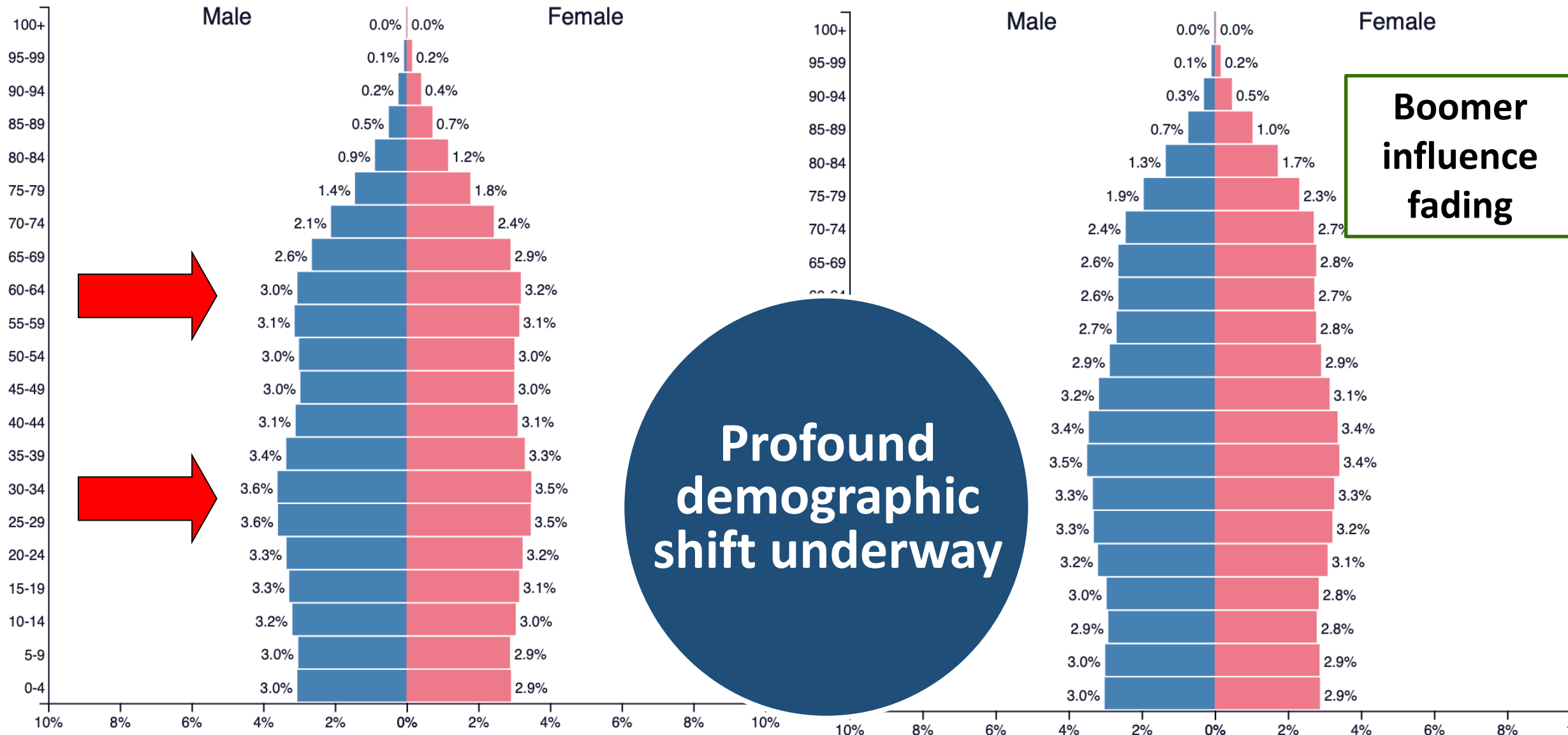
**Production and recreation landscapes**

United States of America ▼  
2022

Population: 334,805,268

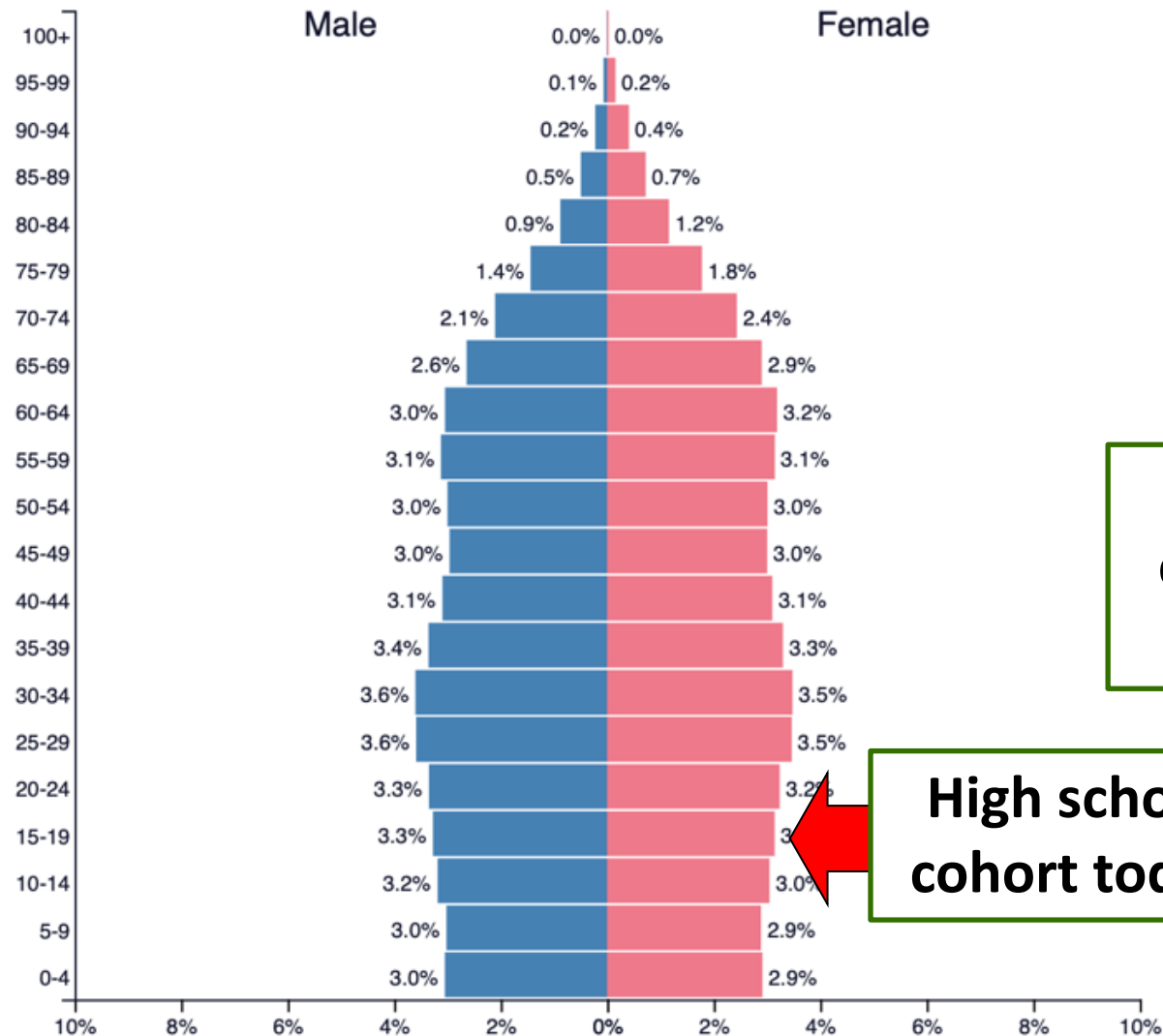
United States of America ▼  
2032

Population: 353,335,452



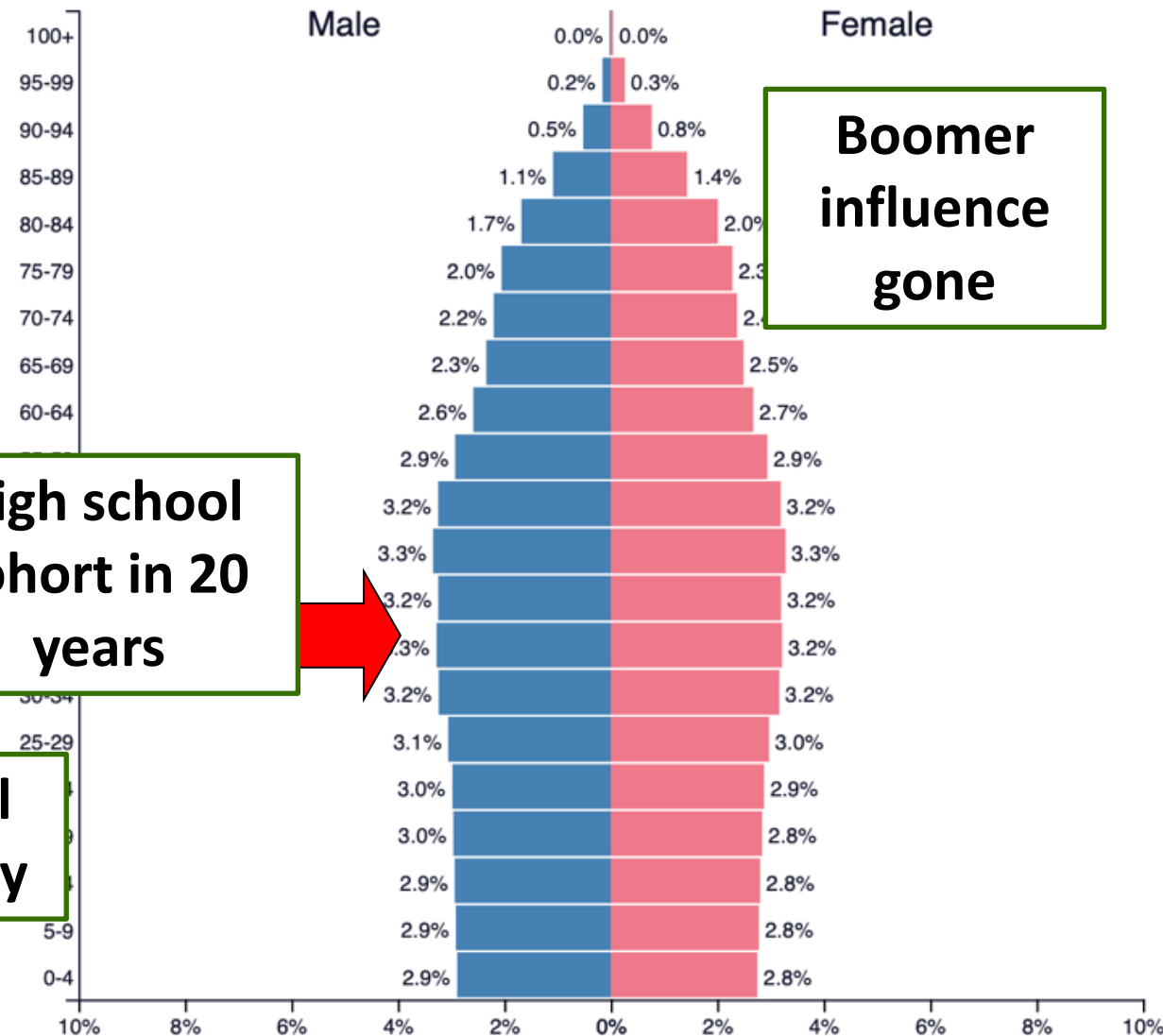
# United States of America ▼ 2022

Population: 334,805,268



# United States of America ▼ 2042

Population: 369,396,554



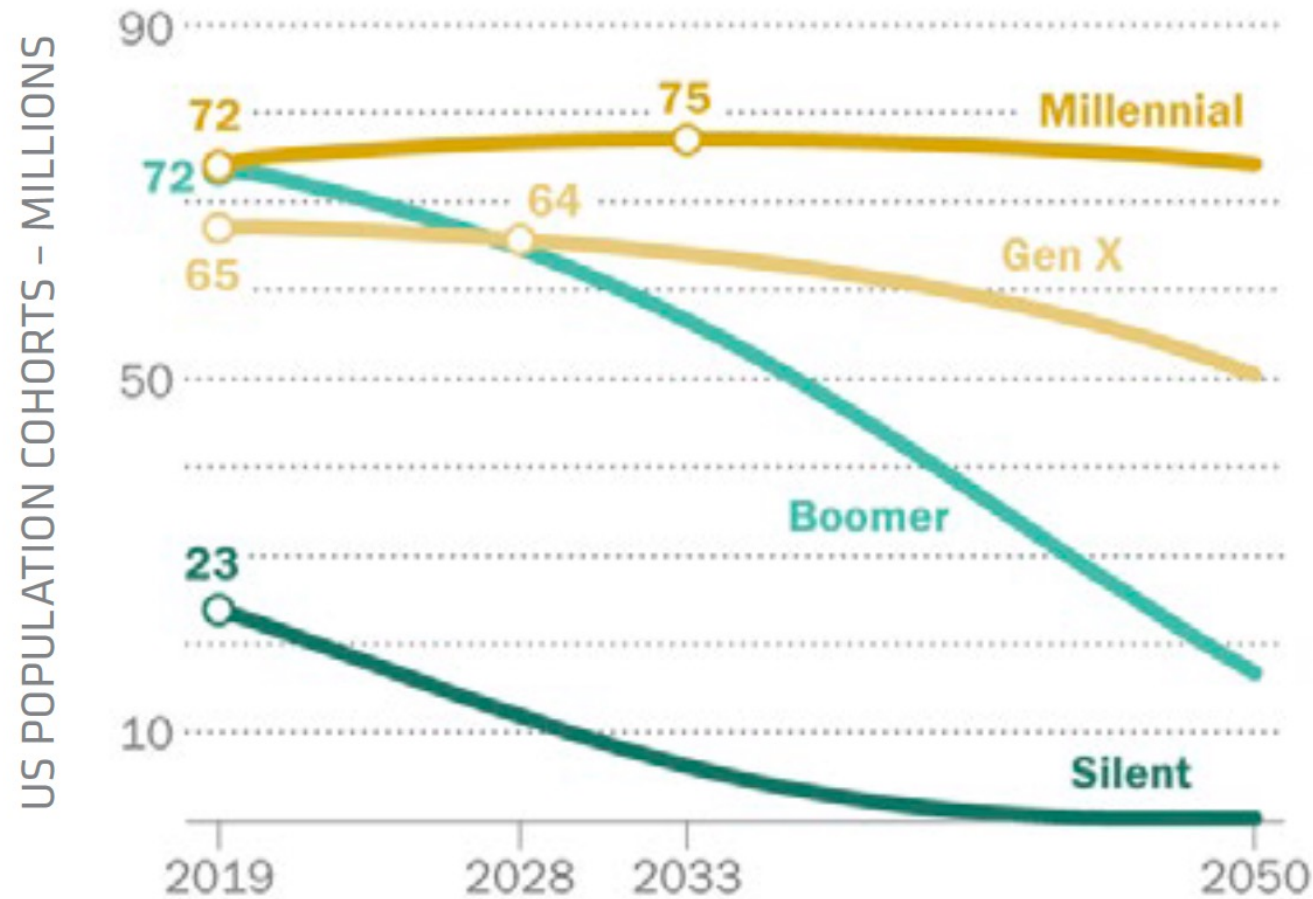
**Boomer  
influence  
gone**

**High school  
cohort in 20  
years**

**High school  
cohort today**



## US Projected population by generation (millions)



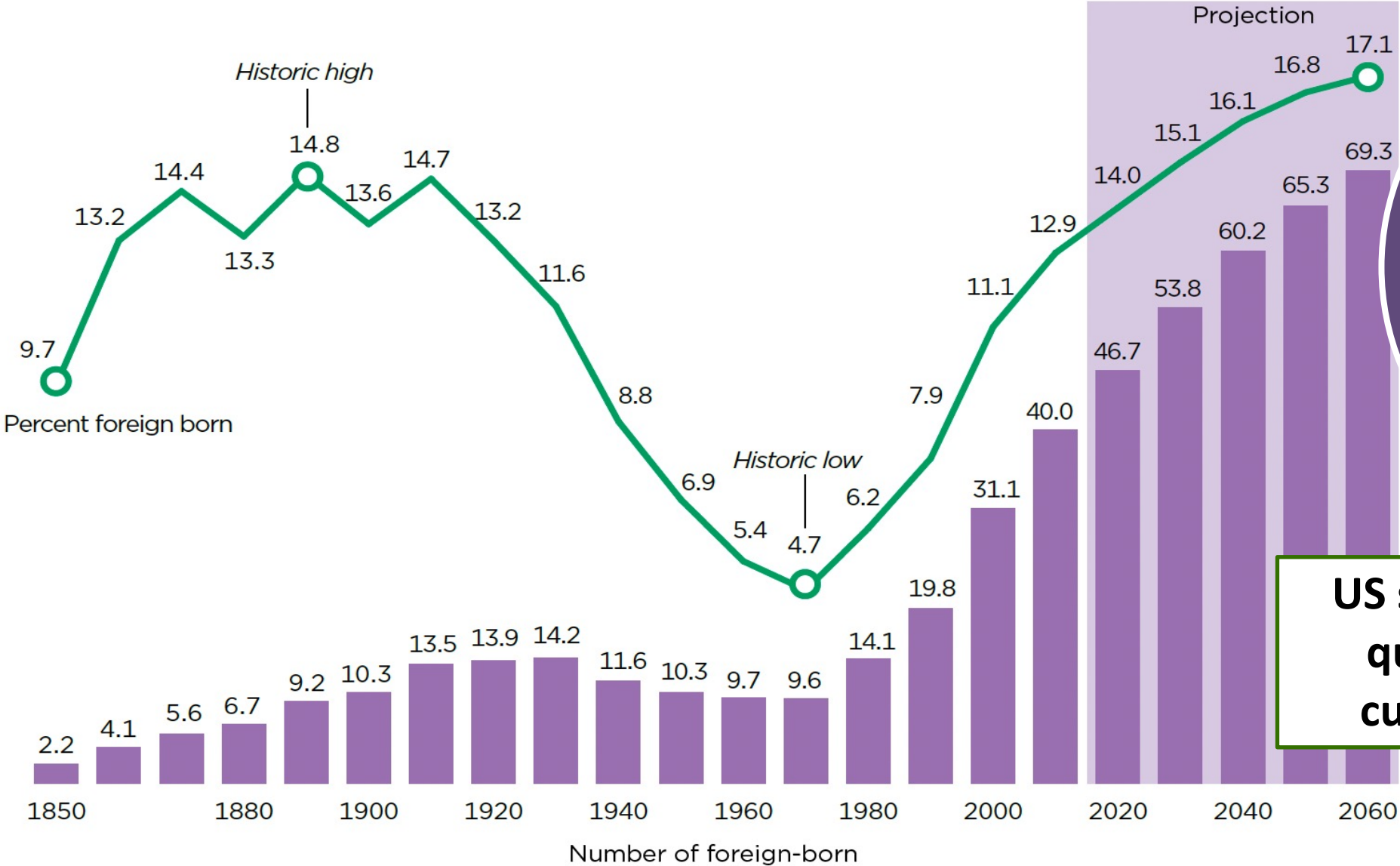
**Millennial cohort  
will dominate for  
the next 30 years**

**The decade of the 2020's  
will see rapid shift in  
generational influence –  
Workforce and  
Workplaces will  
transform**

Source: PEW Research Center – tabulations based on U.S. Census Bureau population estimates released April 2020 and population projections released December 2017. (Millennials refers to the population ages of 23 to 28, as of 2019).

# Foreign-Born People Living in the United States: 1850 to 2010, Projected 202 to 2060

By 2028, the foreign-born share of the U.S. population is projected to be higher than at any time since 1850.



Foreign born % increasing

US society is changing quickly, with more cultures and voices

Source: U.S. Census Bureau, 1850-2000 Decennial Censuses, American Community Survey 2010, 2017 National Population Projections for 2020-2060.



Blow in her face and she'll follow you anywhere

Hit her with tangy Tipalet Cherry. Or rich, grape-y Tipalet Burgundy. Or luscious Tipalet Blueberry. It's Wild! Tipalet. It's new. Different. Delicious in taste and in aroma. A puff in her direction and she'll follow you, anywhere. Oh yes.... you get smoking satisfaction without inhaling smoke.

Smokers of America do yourself a flavor. Make your next cigarette a **Tipalet**

New from Muriel. About 5 for 25¢.

For a better start in life  
**start COLA earlier!**

**How soon is too soon?**

Not soon enough. Laboratory tests over the last few years have proven that babies who start drinking soda during that early formative period have a much higher chance of gaining acceptance and "fitting in" during those awkward pre-teen and teen years. So, do yourself a favor. Do your child a favor. Start them on a strict regimen of sodas and other sugary carbonated beverages right now, for a lifetime of guaranteed happiness.

**The Soda Pop Board of America**  
1515 W. Hart Ave. - Chicago, ILL.

- Promotes Active Lifestyle!
- Boosts Personality!
- Gives body essential sugars!

Shifting  
societal  
values



# Predictions and observations

- Generational change is coming which will trigger widespread upheaval of norms.
- People and industries will continue to cluster around megacities, in specialized cities and regional centers.





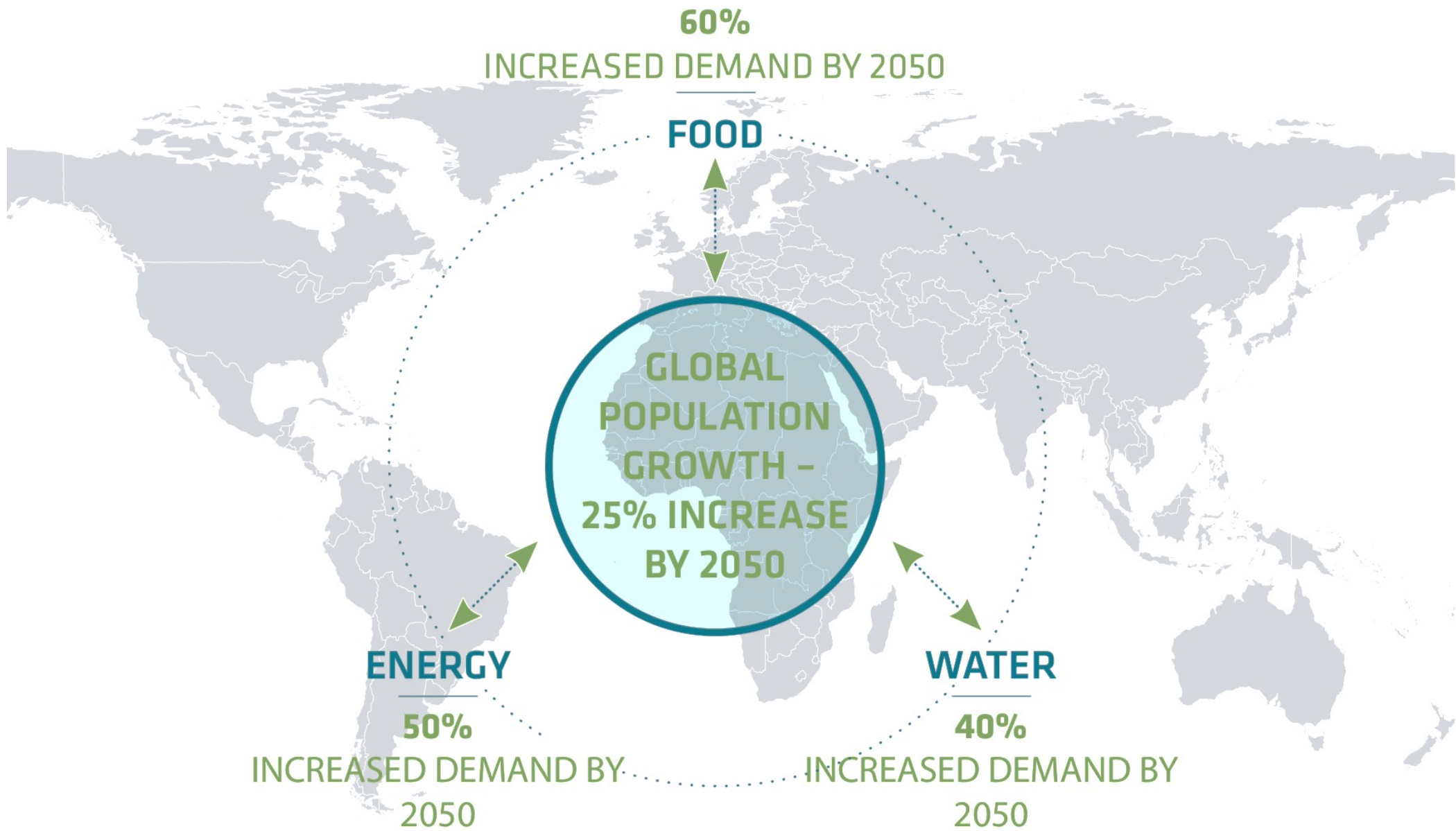
## **Demographic + Population + Mass Urbanization**

What does this mean for the  
the future of the Vermont forest industries and  
economy?

# Energy + Water + Food + Climate Change







# Renewable Energy

Potential for  
unlimited  
cheap energy

Electrification of the  
world is accelerating,  
driven by renewable  
energy



# FRESH WATER

- Nearly 450 million people in 29 countries now face severe water shortages
- As much as 2/3 of the world population could be water-stressed by 2025
- Half the world's rivers and lakes are seriously polluted



- Irrigation uses 70% of the world's fresh water
- Water scarcity will be the chief constraint to increased food production
- The threat to water resources stands as one of the major crises facing the planet



Upper-middle and  
northeast USA  
has 20% of  
global surface  
freshwater  
resources



**2 BILLION**

PEOPLE DON'T GET ENOUGH VITAMINS AND MINERALS

**795 MILLION**

PEOPLE DON'T GET ENOUGH CALORIES

**161 MILLION**

CHILDREN ARE CHRONICALLY UNDERNOURISHED

WE HAVE A BIG PROBLEM WITH  
**UNDERNUTRITION**

WE HAVE A BIG PROBLEM WITH  
**OVERWEIGHT & OBESITY**

**1.9 BILLION**

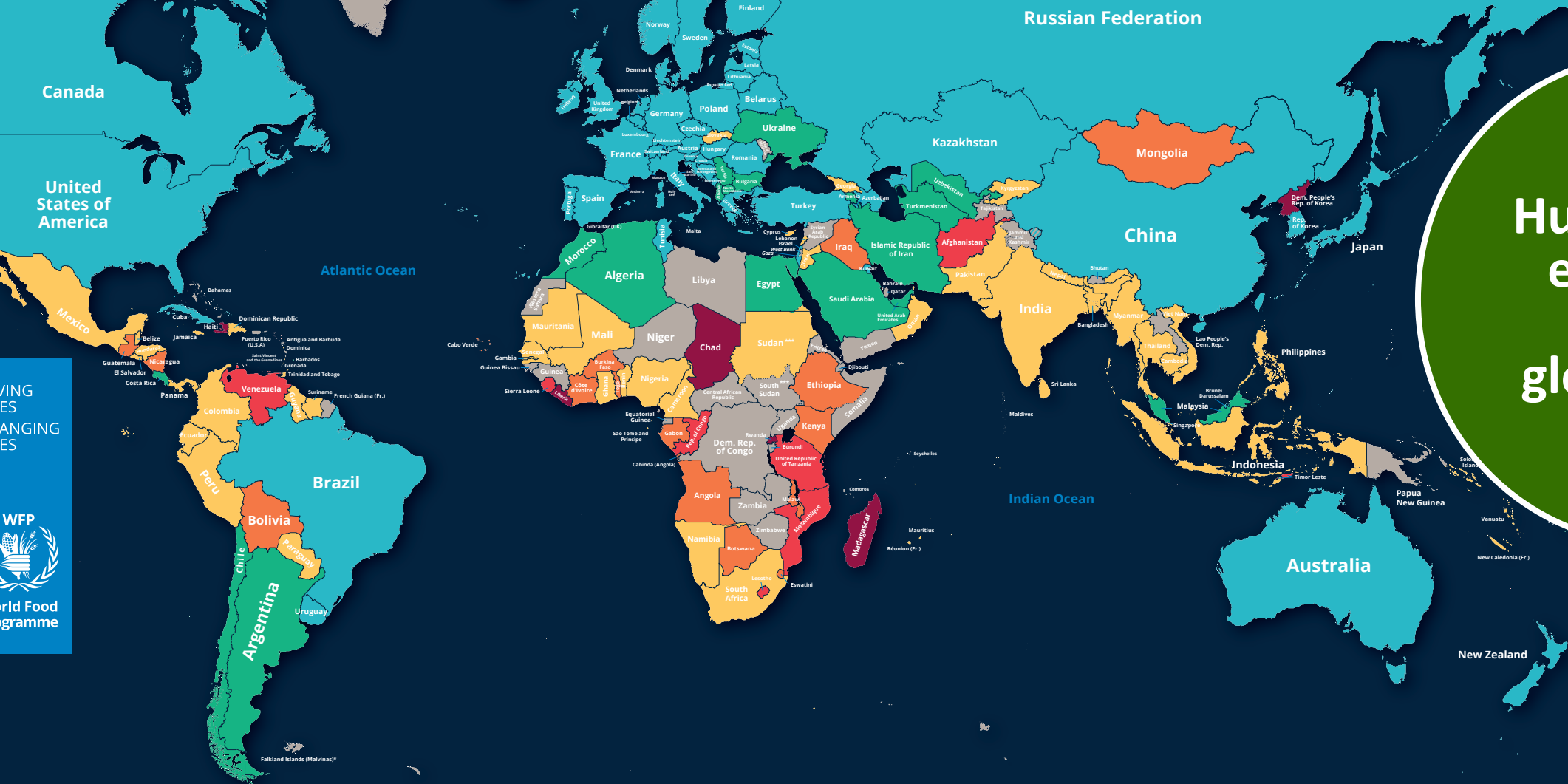
ADULTS ARE OVERWEIGHT OR OBESE

**1 in 12**

ADULTS HAVE DIABETES

**42 MILLION**

CHILDREN ARE OVERWEIGHT



Hunger is an emerging critical global issue

# Hunger Map 2020

**CHRONIC HUNGER**

If current trends continue, the number of hungry people will reach 840 million by 2030

<2,5% <5% 5-14,9% 15-24,9% 25-34,9% >35% DATA NOT AVAILABLE

Prevalence of undernourishment in the total population (percent) in 2017-19

Undernourishment is defined as the condition in which an individual's habitual food consumption is insufficient to provide the amount of dietary energy required to maintain a normal, active, healthy life. The indicator is reported as the prevalence of undernourishment (PoU), which is an estimate of the percentage of individuals in the total population that are in a condition of undernourishment. To reduce the influence of possible estimation errors in some of the underlying parameters, national estimates are reported as a three-year moving average. Source: FAO, IFAD, UNICEF, WFP and WHO. 2020. The State of Food Security and Nutrition in the World 2020. Transforming food systems for affordable healthy diets. Rome, FAO. Further information is available at <https://www.wfp.org/publications/state-food-security-and-nutrition-world-report-2020>

© World Food Programme 2020

The designations employed and the presentation of material in this map does not imply the expression of any opinion whatsoever on the part of WFP concerning the legal or constitutional status of any country, territory or sea area, or concerning the delimitation of frontiers.

\* A dispute exists between the Governments of Argentina and the United Kingdom of Great Britain and Northern Ireland concerning sovereignty over the Falkland Islands (Malvinas).

\*\* Partial line represents approximately the Line of Control in Jammu and Kashmir agreed upon by India and Pakistan. The final status of Jammu and Kashmir has not yet been agreed upon by the parties.

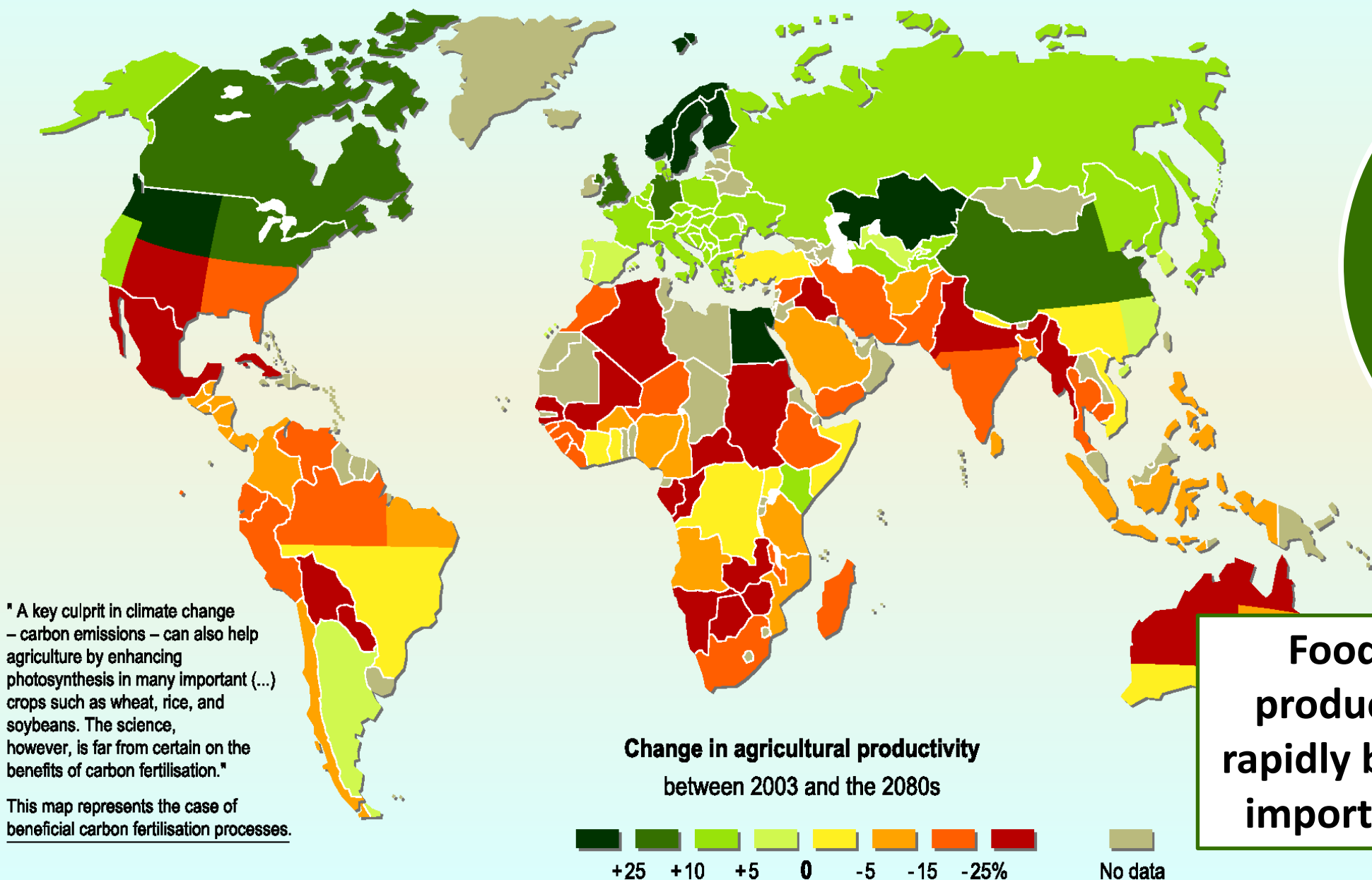
\*\*\* Partial boundary between the Republic of Sudan and the Republic of South Sudan has not yet been determined.

— International Boundary ..... Armistice or International Administrative Line ——— Other Line of Separation ..... Special boundary line

25 September 2020



# Projected impact of climate change on agricultural yields

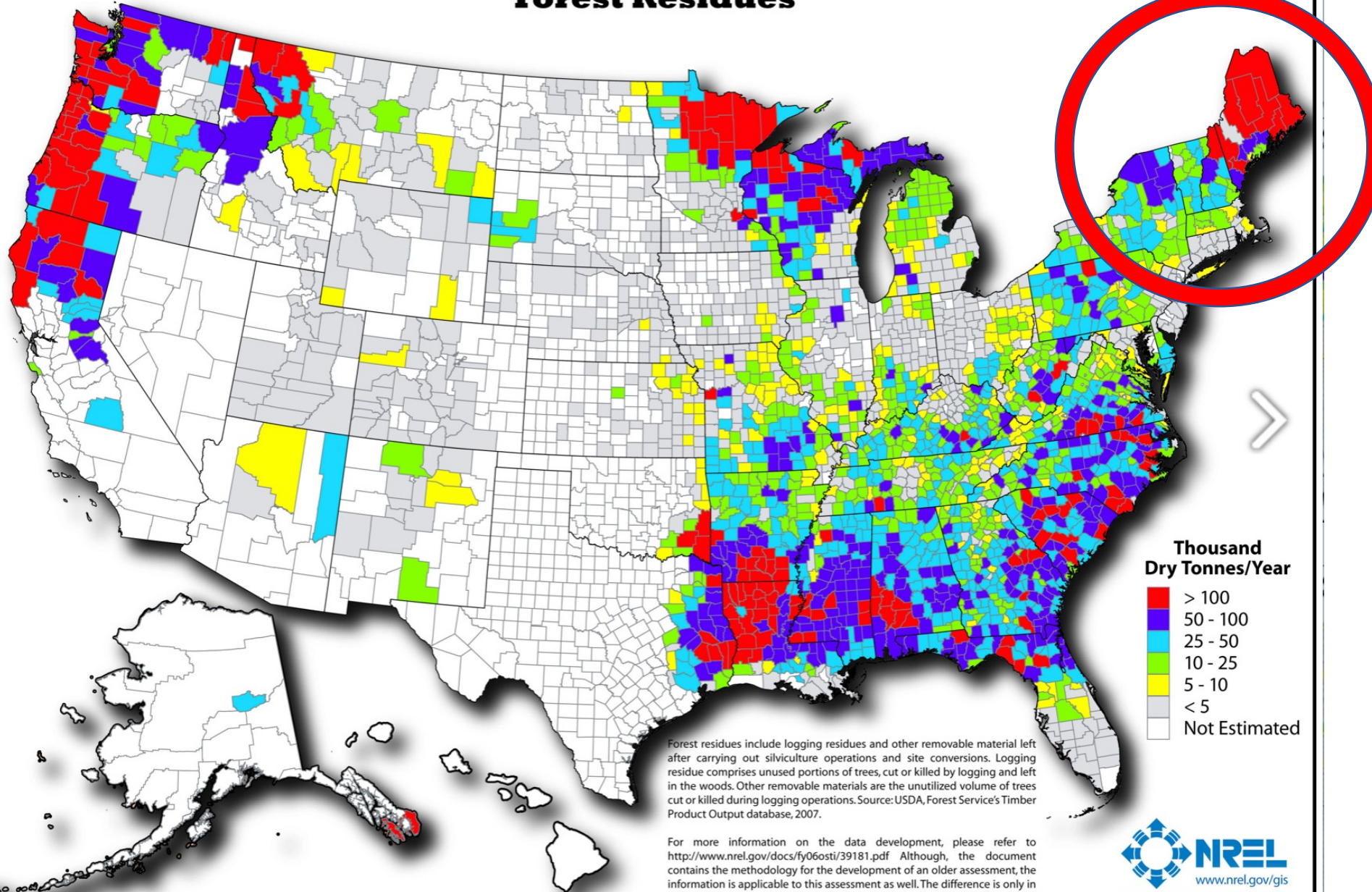


Increases  
and  
decreases

Food security and  
production capability  
rapidly becoming a more  
important global issue

# Biomass Resources of the United States

## Forest Residues



Forest residues include logging residues and other removable material left after carrying out silviculture operations and site conversions. Logging residue comprises unused portions of trees, cut or killed by logging and left in the woods. Other removable materials are the unutilized volume of trees cut or killed during logging operations. Source: USDA, Forest Service's Timber Product Output database, 2007.

For more information on the data development, please refer to <http://www.nrel.gov/docs/fy06osti/39181.pdf>. Although, the document contains the methodology for the development of an older assessment, the information is applicable to this assessment as well. The difference is only in the data's time period.



This map was produced by the  
National Renewable Energy Laboratory  
for the U.S. Department of Energy.

Regional  
biomass  
capability

Northern corridor will  
become increasingly  
important region for the  
bio-economy



# New Climate Maps Show a Transformed United States

by [Al Shaw](#), [Abraham Lustgarten](#), ProPublica, and Jeremy W. Goldsmith,  
Special to ProPublica, September 15, 2020.

In the United States, that niche today blankets the heart of the country, from the Atlantic seaboard through northern Texas and Nebraska, and the California coast.

According to new data from the Rhodium Group analyzed by ProPublica and The New York Times Magazine, warming temperatures and changing rainfall will drive agriculture and temperate climates northward, while sea level rise will consume coastlines and dangerous levels of humidity will swamp the Mississippi River valley.





But as the climate warms, the niche could shift drastically northward. Under even a moderate carbon emissions scenario (known as RCP 4.5), by 2070 much of the Southeast becomes less suitable and the niche shifts toward the Midwest.

In a [paper](#) published in the Proceedings of the National Academy of Sciences, a team of researchers modeled the human climate “niche”: the regions where temperature and precipitation have been most suitable for humans to live in over the past 6,000 years.



# New Climate Maps Show a Transformed United States

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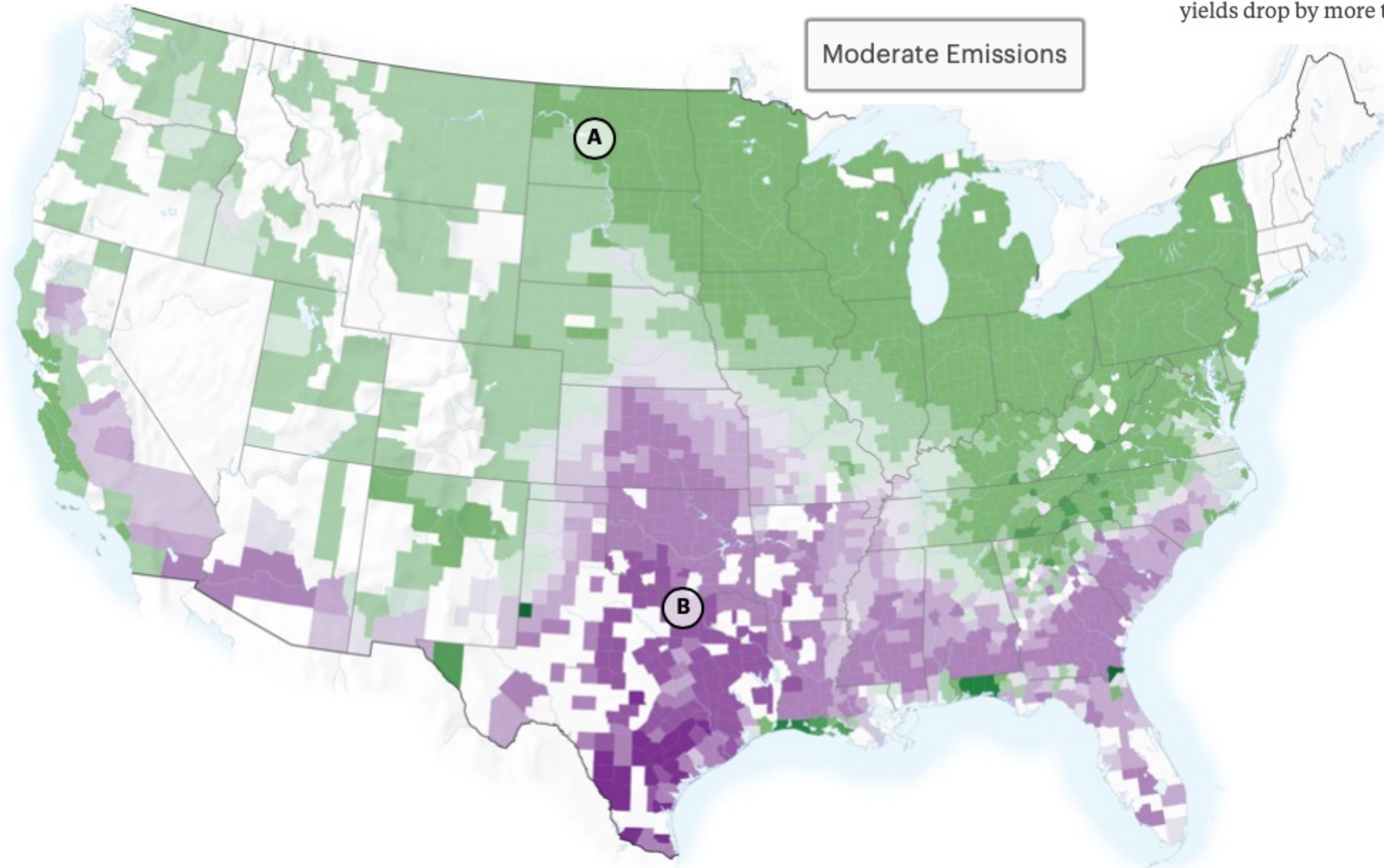


 **PROPUBLICA**  
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<https://projects.propublica.org/climate-migration/>



## Farm Crop Yields: 2040-2060

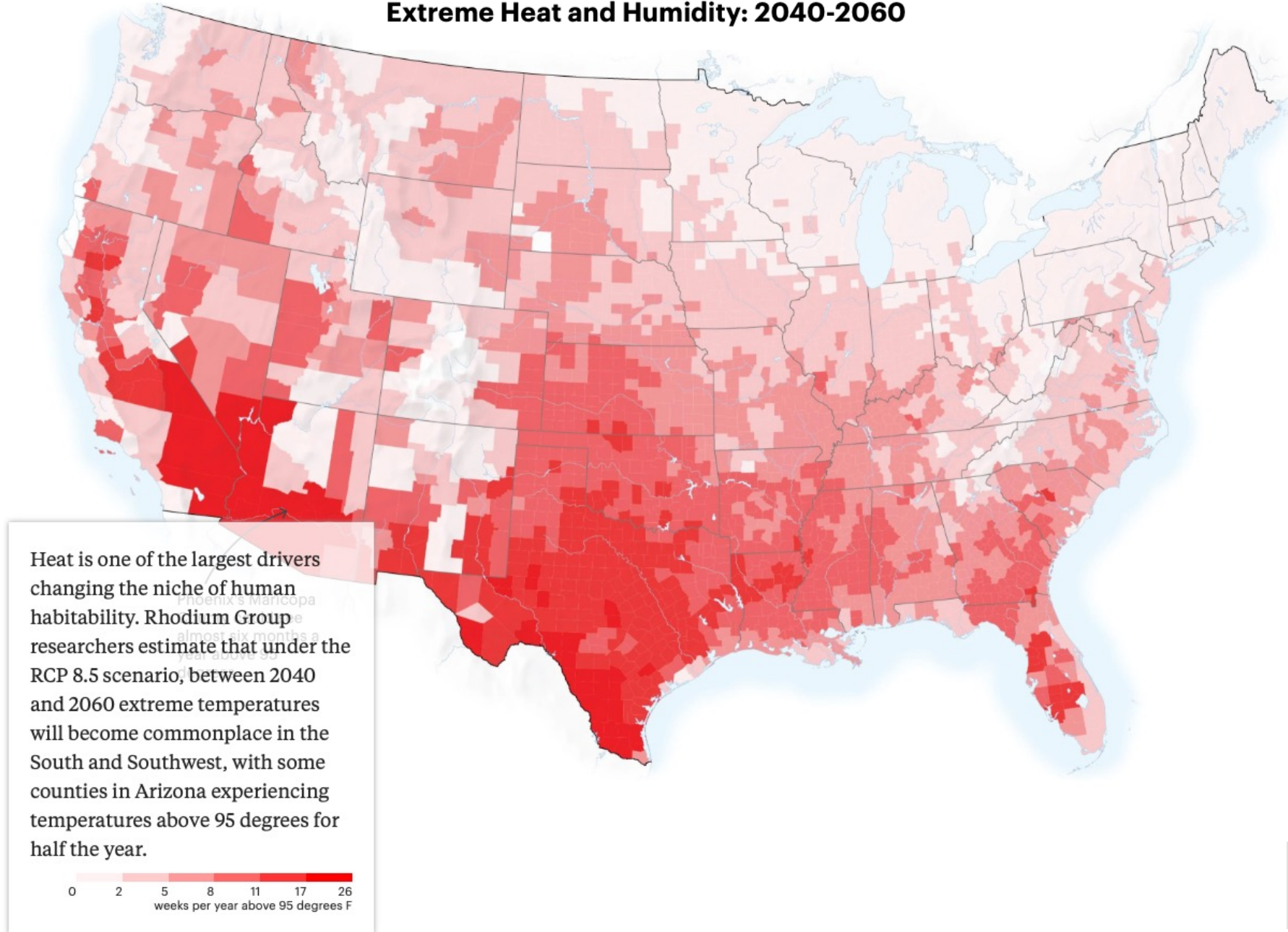


Corn and soy production is more sensitive to heat than drought, and it will decrease for every degree of warming. By midcentury, North Dakota **(A)**, which already harvests millions of acres of both crops, will warm enough to allow for more growing days and higher yields. But parts of Texas and Oklahoma **(B)** may see yields drop by more than 70%.





## Extreme Heat and Humidity: 2040-2060

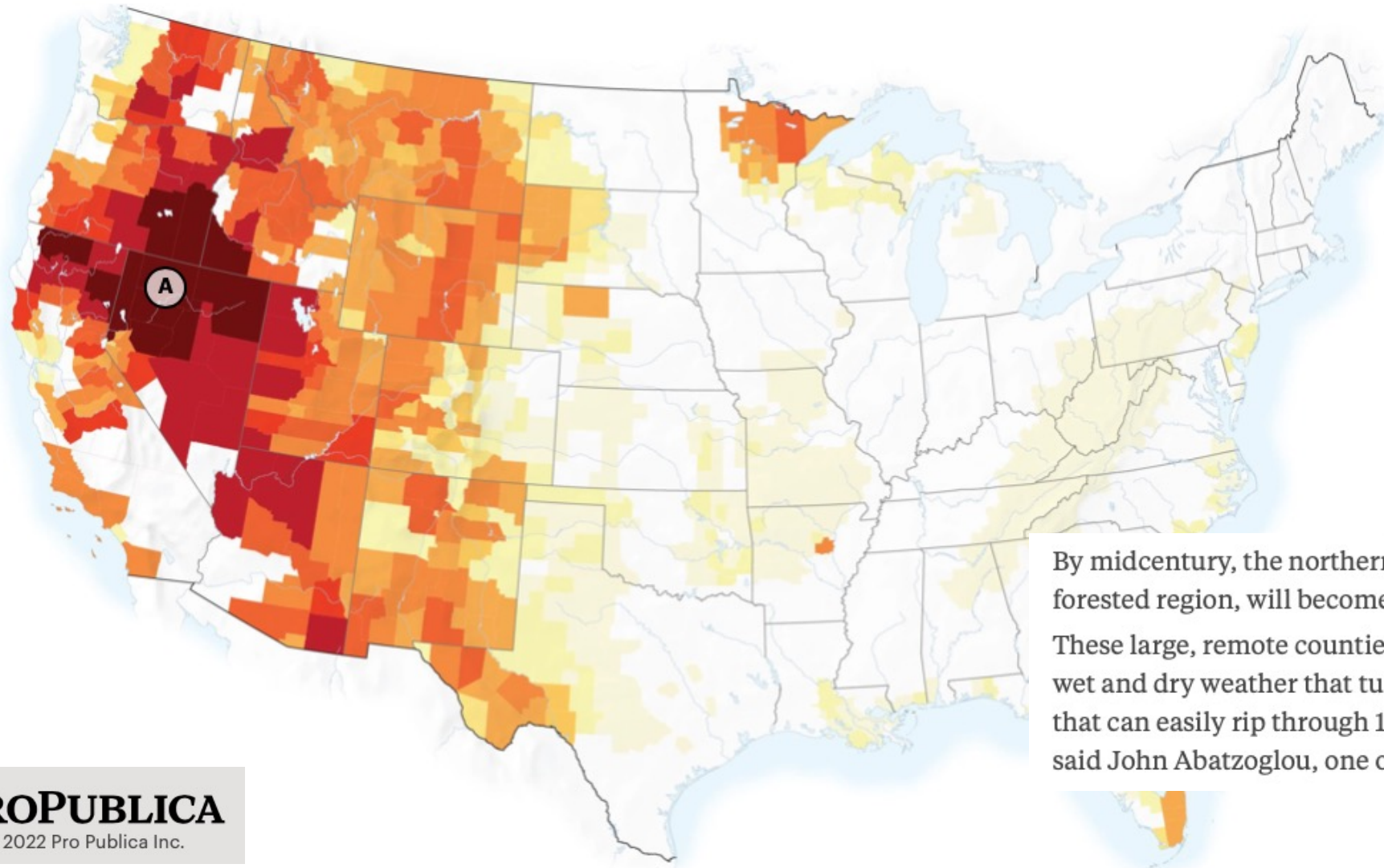
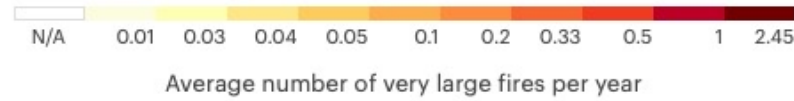




High Emissions



## Large Wildfires: 2040-2071



By midcentury, the northern Great Basin, though not a densely forested region, will become the epicenter of large wildfires (A). These large, remote counties in Nevada and Oregon see cycles of wet and dry weather that turn the grassland into the fuel for fires that can easily rip through 10,000 acres a day with strong winds, said John Abatzoglou, one of the authors of the study.

High Emissions

Moderate Emissions



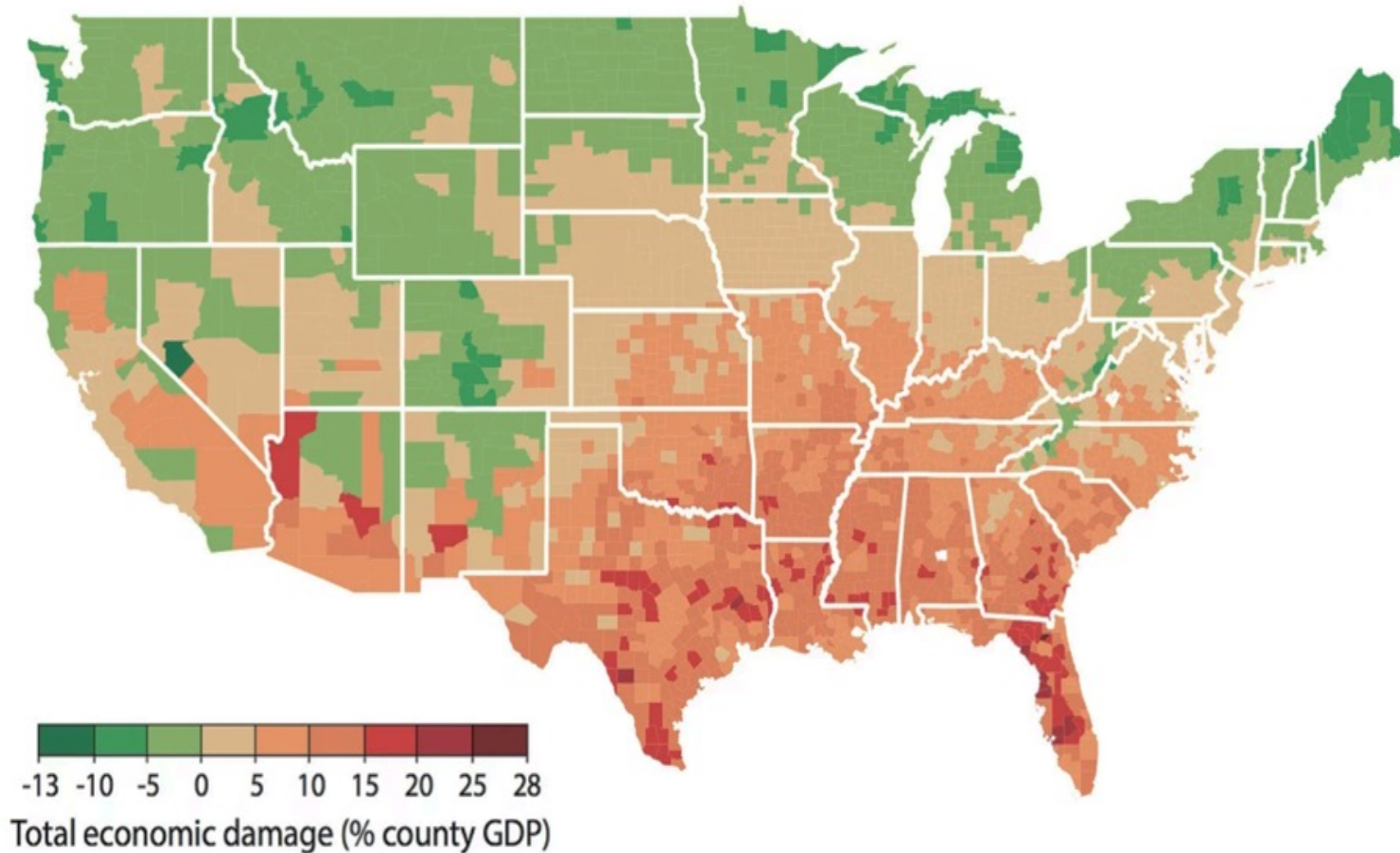
# Sea Level Rise: 2040-2060



Percentage of property below high tide



Some 50 million Americans live in eight of the largest U.S. metro areas — Miami (A), New York (B) and Boston (C) among them — which all lie in some of the most affected counties in the U.S.



Potential economic damages are shown at the county level in a scenario in which emissions of greenhouse gases continue at current rates. Green indicates areas that could see economic benefits. To see an interactive version of this map, click [here](#).

Hsiang, Kopp, Jina, Rising, et al./Science

Source: [Christopher Joyce, MPR News, June 29, 2017](#)

**Long term  
GDP impact  
positive in  
north**

**Climate change may  
drive migration patterns  
within US may move to  
'north', and from 'west  
to center'**



# Predictions and observations

- Growing global disconnect between where food and fiber will be consumed, and where it can be grown.
- Northern corridor in USA is poised to capitalize on intersect of water, energy and biomass / food production capability.
- New migration patterns are emerging





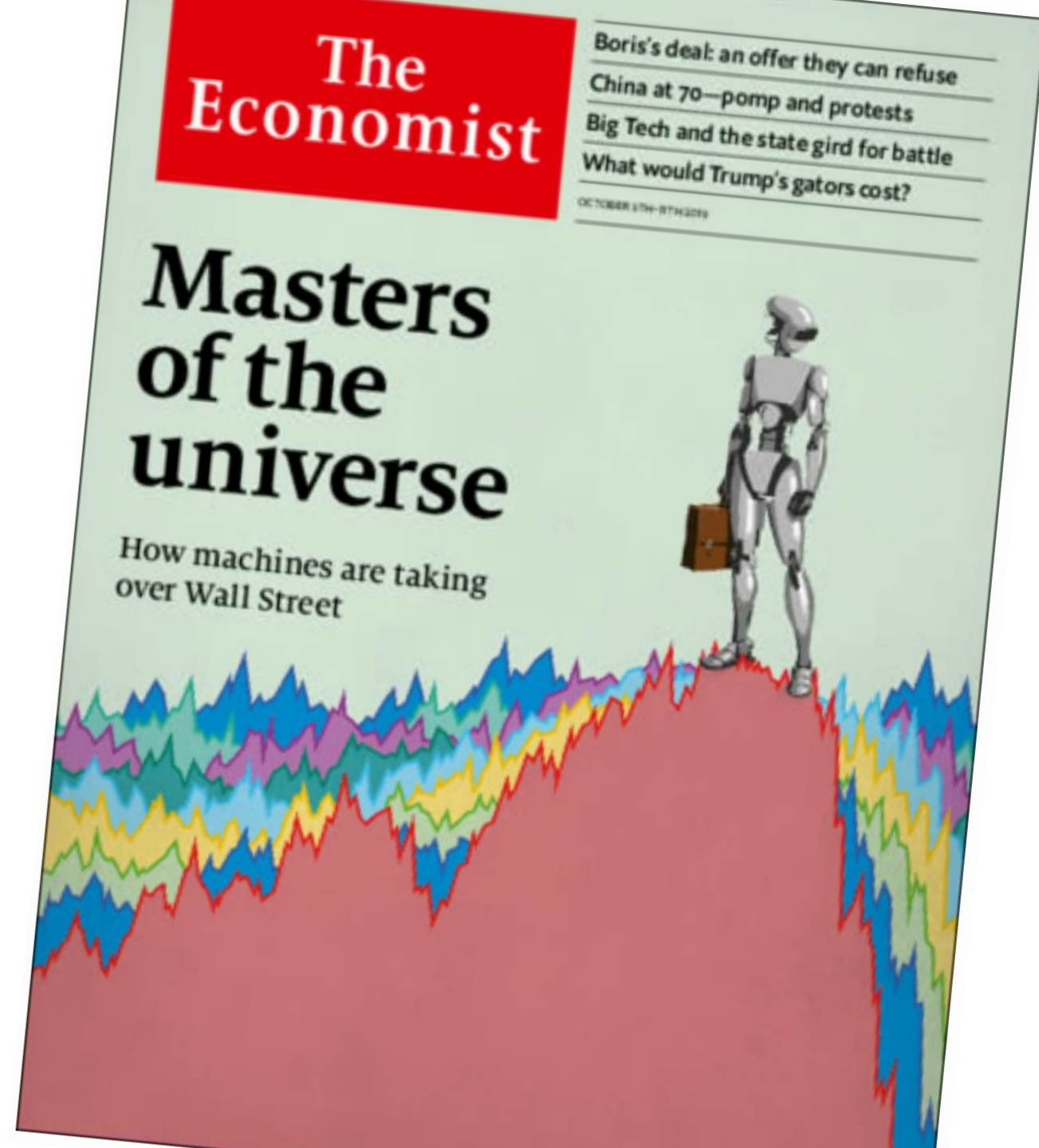
# **Food, Energy, Water and Climate Change**

What do these trends mean for the  
the future of the Vermont forest industries and  
economy?

# Technology and the speed of change

future→iQ

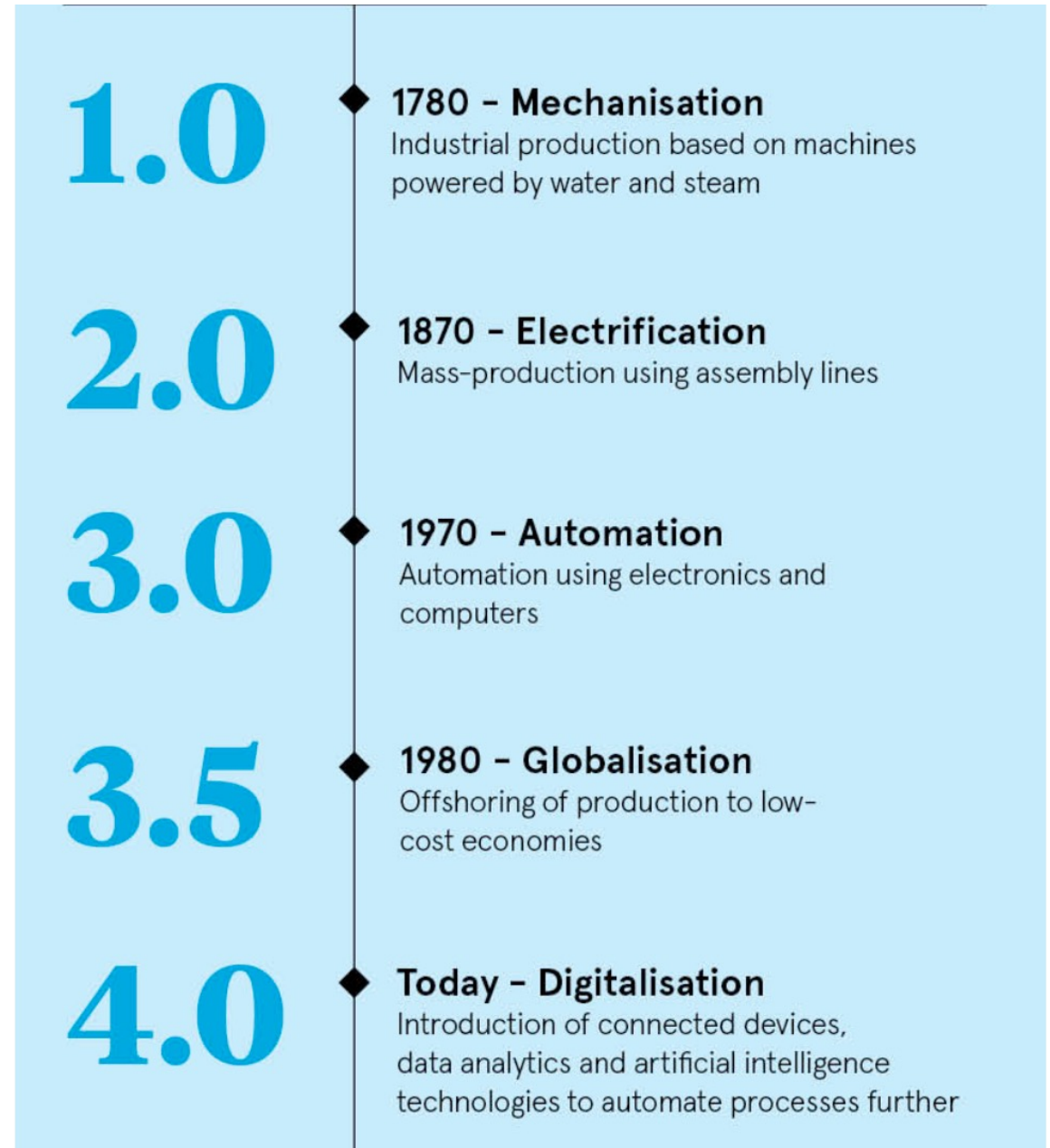
Create Future Intelligence™



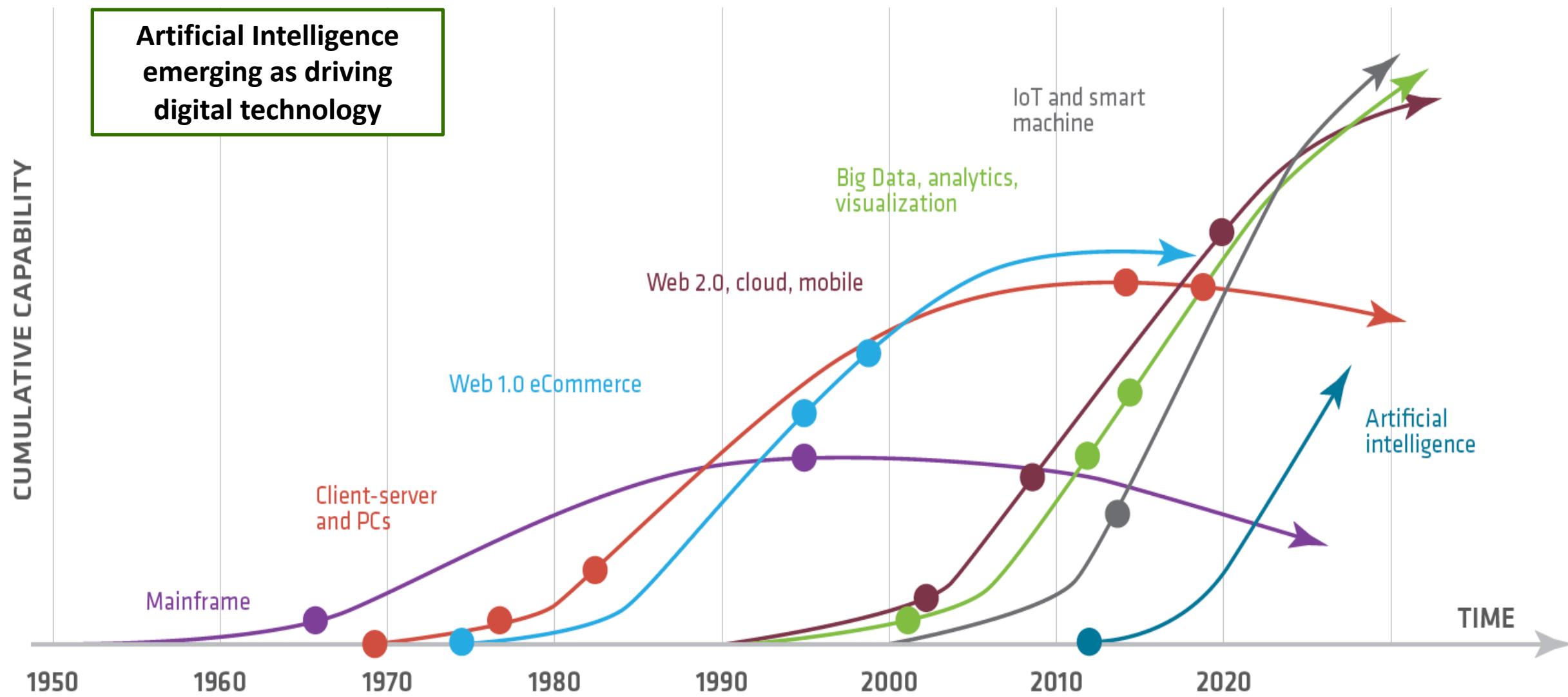


# What makes this industrial revolution different?

- Machine learning / Artificial Intelligence
- Converging technologies
- Exponential impacts

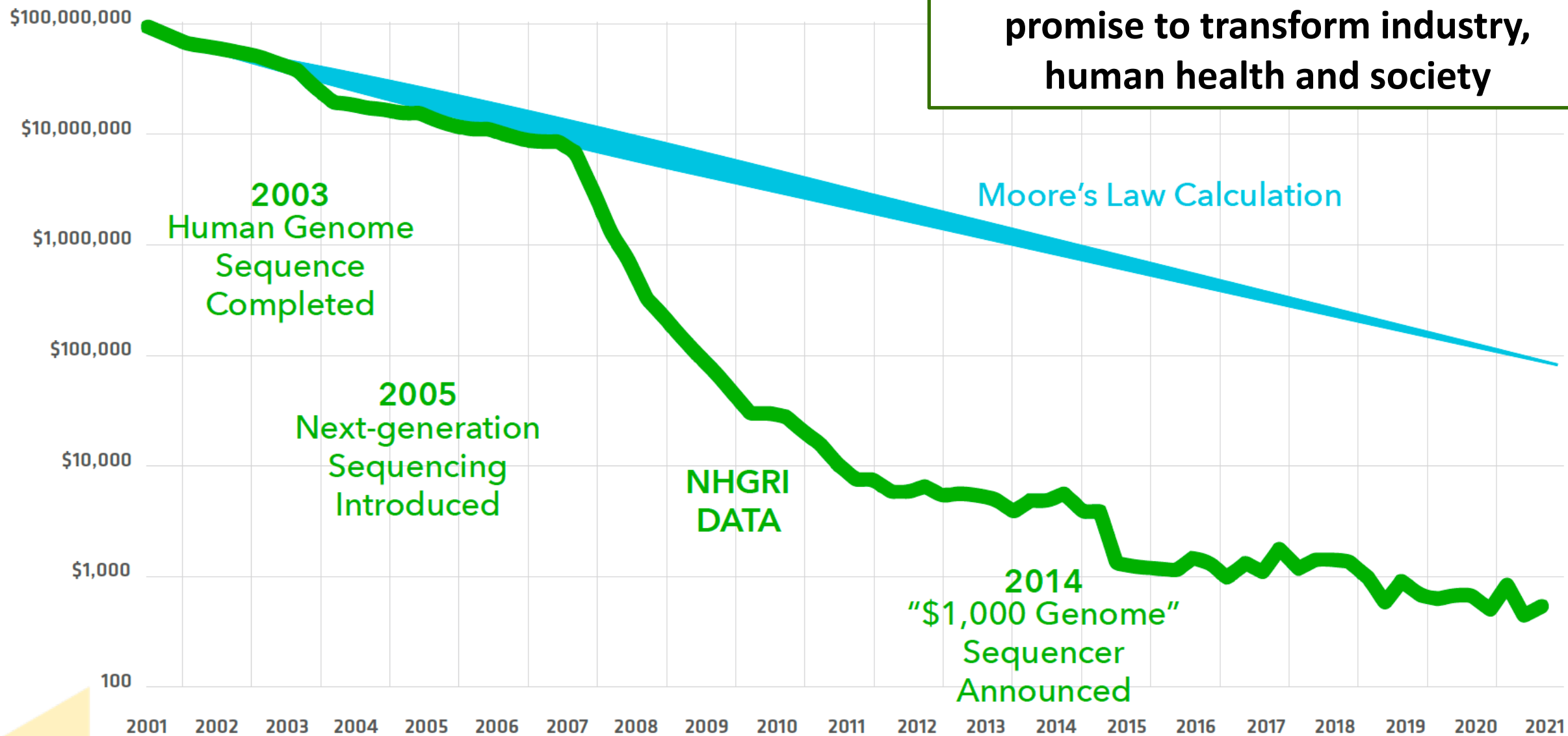


THE INCREASING CAPABILITY OF DIGITAL TECHNOLOGIES



Technology is driving down cost of fascinating new developments, that promise to transform industry, human health and society

## DNA SEQUENCING COSTS OVER TIME

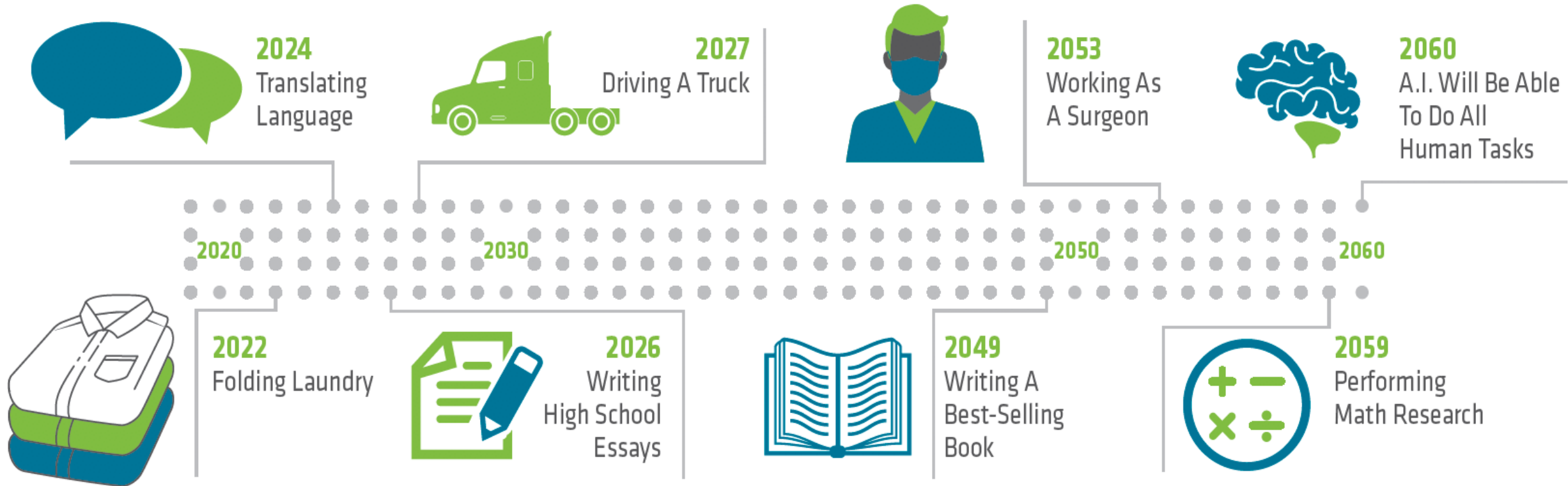




# When will AI outperform people?

**AI is reshaping our lives  
and industries – right  
now**

AI WILL LIKELY OUTPERFORM HUMANS AT...



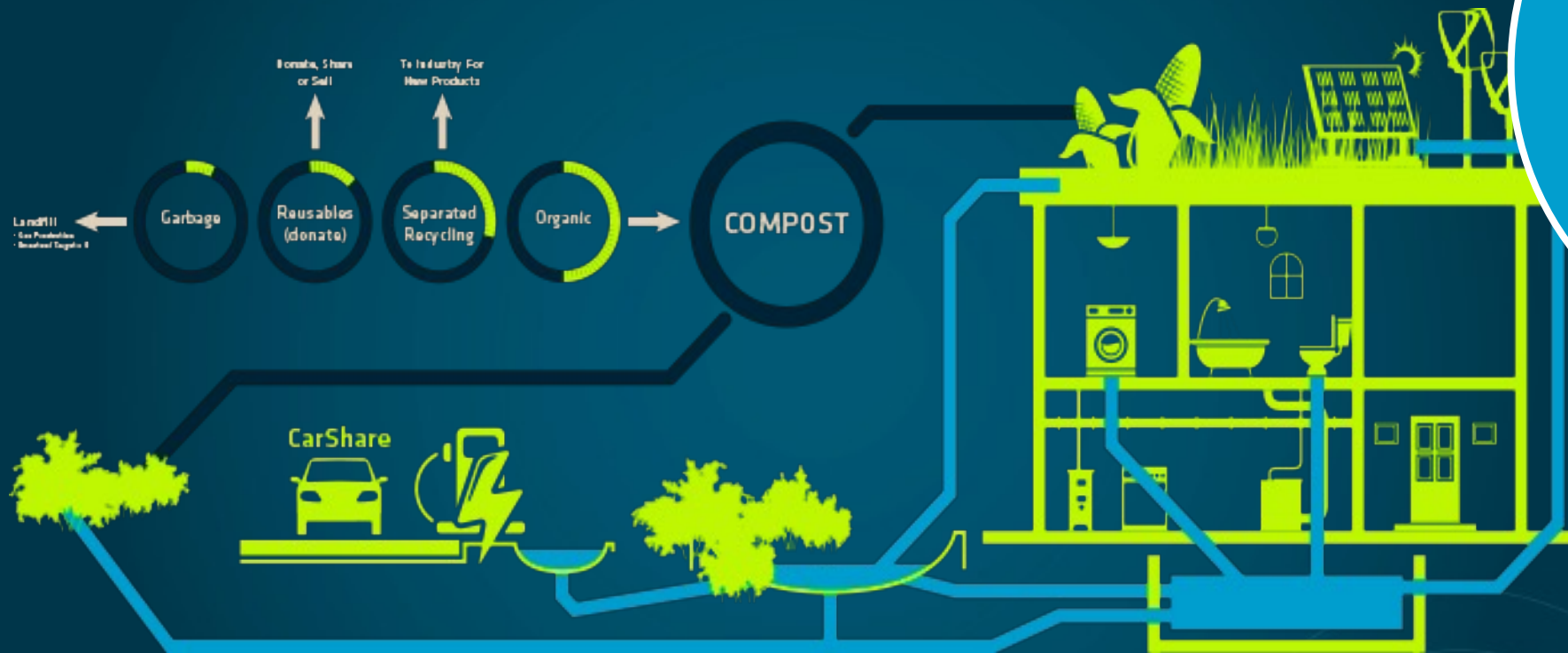
Source: 'You Will Lose Your Job to a Robot—and Sooner Than You Think'. Kevin Drum, Mother Jones, November / December Issue, 2017. (adapted from 'When will AI exceed human performance? Evidence from AI Experts', Oxford and Yale University 2017)<sup>12</sup>

Reproduced from Next Industrial Revolution, Future iQ, 2018



Source: New Yorker Oct 23, 2017, and Max Planck Research 2009

# New 'local systems'



future*→*iQ **Partners** | Create Future Intelligence™  
www.future-iq.com



# Rapid systemic change and technology integration

Adapted from: Source: Deloitte. 2014. Industry 4.0 Challenges and solutions for the digital transformation and use of exponential technologies

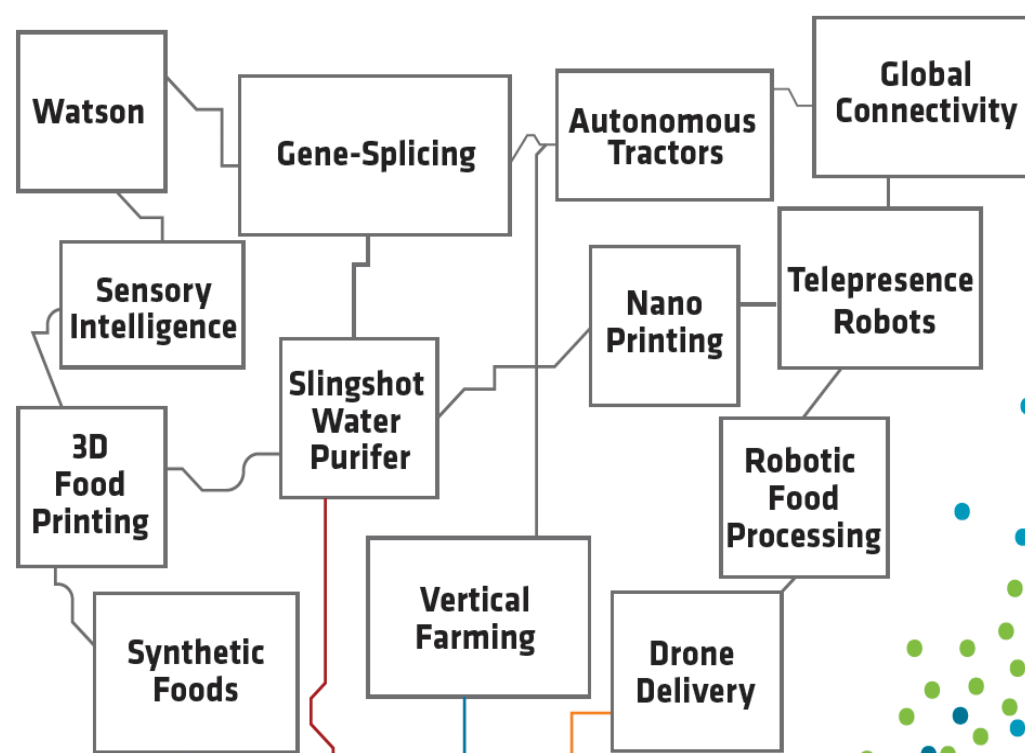
SPEED OF TECHNOLOGICAL CHANGE

EXPONENTIAL TECHNOLOGIES

**Technological Development**  
Moore's Law: The power of chips, bandwidth and computer doubles appr. every 18 months.

**The Human Factor**  
Technological dev. feeds and enables various trends in society: Democratisation, Social Connection, DIY, Decentralisation.

Biotech  
Neurotech  
Nanotech  
New Energy & Sustainability  
ICT & Mobile Technology  
Sensing  
3D Food Printing  
Artificial Intelligence  
Robotics  
Drones

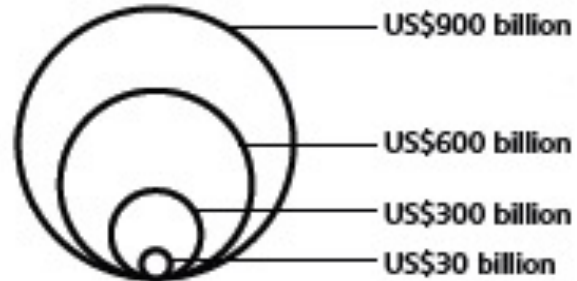


FROM LINEAR TO EXPONENTIAL GROWTH TRAJECTORY

## Global technology and innovation landscape might change rapidly

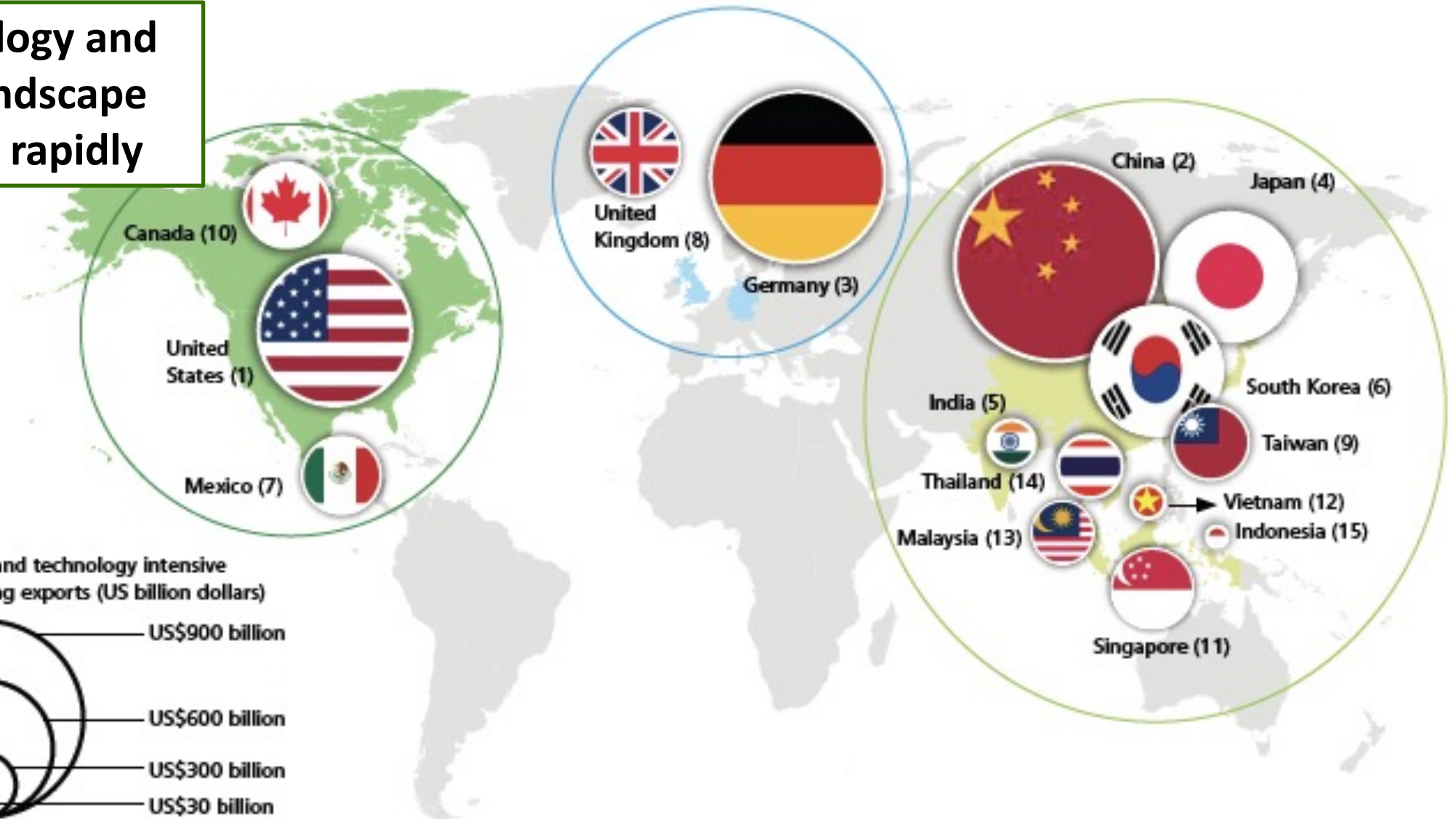


High skilled and technology intensive manufacturing exports (US billion dollars)



Note: Figure in parenthesis represent the projected 2020 GMCI rank by CEOs

Source: Deloitte Touche Tohmatsu Limited and US Council on Competitiveness, 2016 Global Manufacturing Competitiveness Index, Deloitte analysis based on UNCTAD data<sup>10</sup>

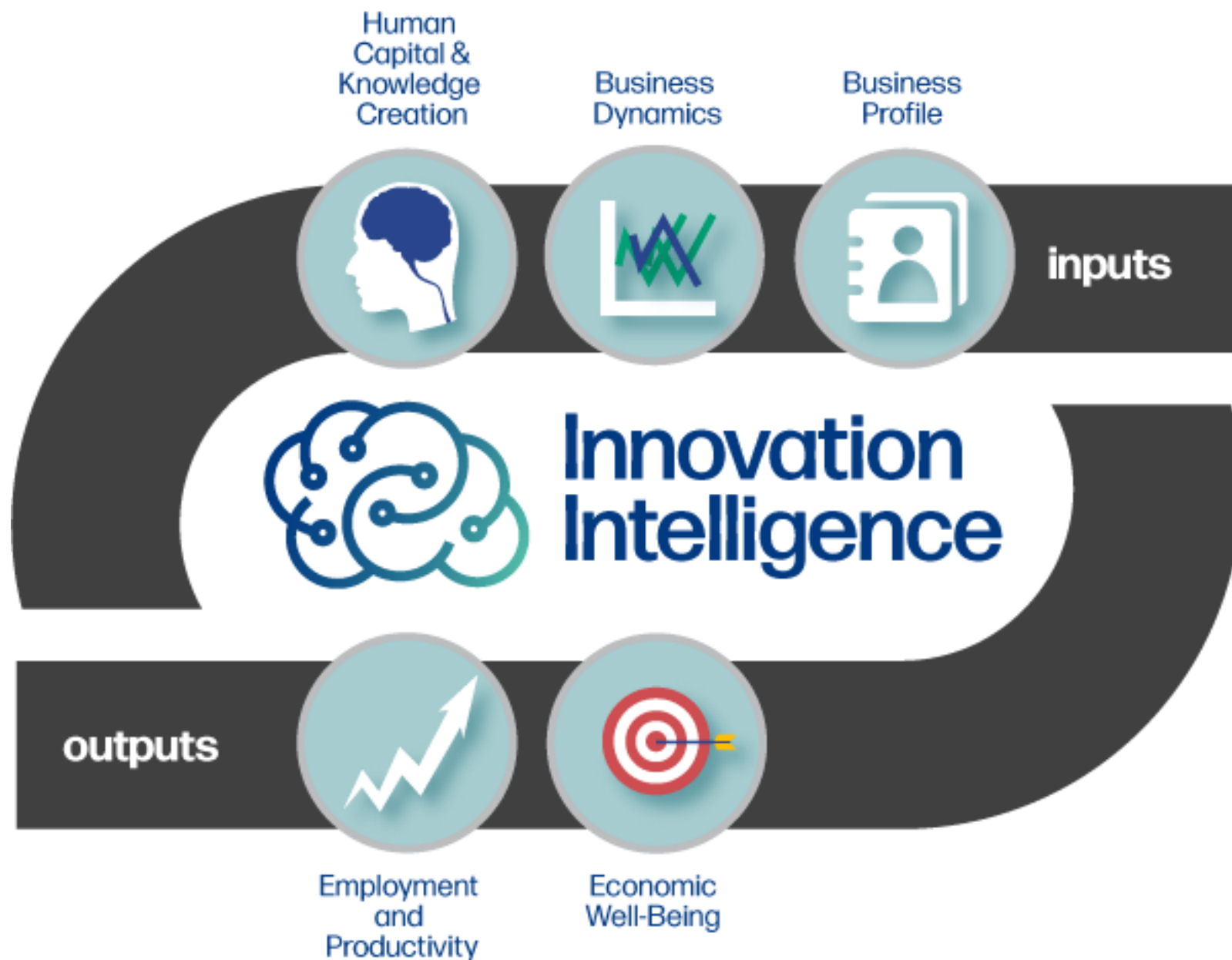


# Predictions and observations

- Waves of disruption and technology are reshaping education, industries and manufacturing
- Speed of change is exponential







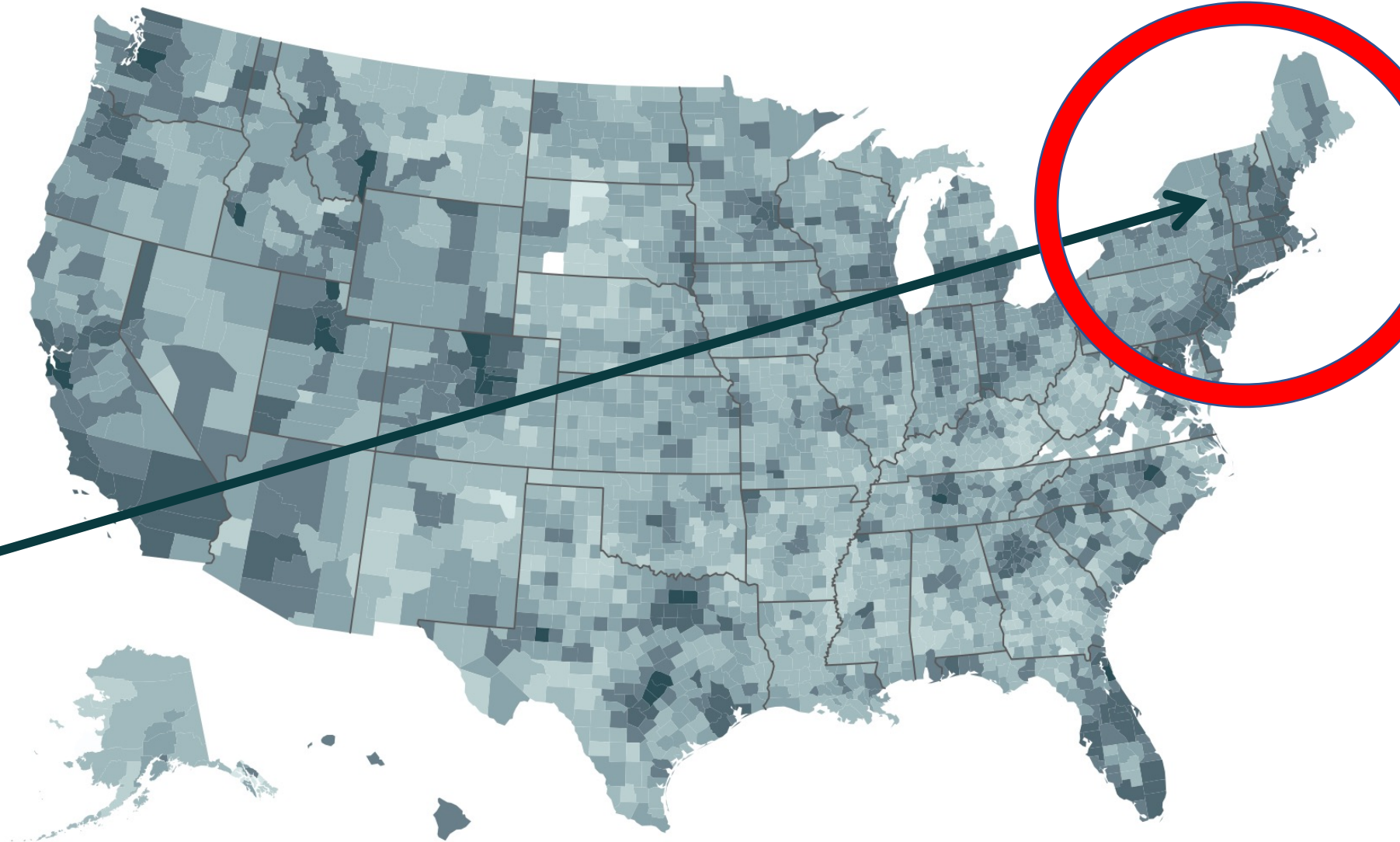
# Headline Innovation Index



Headline Innovation Index

- ▶ Human Capital and Knowledge Creation
- ▶ Business Dynamics
- ▶ Business Profile
- ▶ Employment and Productivity
- ▶ Economic Well-Being

*The Innovation Index includes both innovation inputs and outputs in order to measure both innovation capacity and innovation outcomes.*



**Vermont forest sector  
and economy – is it  
part of the NE  
innovation cluster?**



## **Demographics + Resources + Technology + Innovation**

What does all this mean to the contextual  
future of the Vermont forest economy?



# Key Drivers:

What key drivers do you think are most important for the future of the Vermont forest economy (and forest products sector)?

*(Key drivers are events, trends, developments, catalysts or forces that actively influence or cause change.)*

Table brainstorm



# KEY DRIVER HANDOUT

VERMONT FOREST FUTURE STRATEGIC ROADMAP

Think-Tank Part 1

December 13, 2022



## DRIVER NAME:

Key emergent high-level trends associated with this driver:

1.

2

Potential impacts on the Vermont forest economy over the next decade:

1.

2

**Building an  
understanding  
of each  
driver**

What is the big “FUTURE-SPLITTING QUESTION” for this driver?

Future predictions - how impacts may “play out” for this driver over the next decade:

1.

2

**Building an  
understanding  
of each  
driver**



# IMPACT MATRIX HANDOUT

## VERMONT FOREST FUTURE STRATEGIC ROADMAP

Think-Tank Part 1

December 13, 2022



Rate each driver in terms of likely future impacts on the following dimensions of the forest economy.

IMPACT SCALE: 1 = Low relative impact; 10 = Very high relative impact

|        | Dimensions             |                            |  |                               |
|--------|------------------------|----------------------------|--|-------------------------------|
| Driver | Overall Forest Economy | Quality of Working Forests | Innovation in Forest Product Enterprises | Demand for VT Forest Products |
| 1      |                        |                            |  |                               |
| 2      |                        |                            |  |                               |
| 3      |                        |                            |  |                               |
| 4      |                        |                            |  |                               |
| 5      |                        |                            |  |                               |
| 6      |                        |                            |  |                               |
| 7      |                        |                            |  |                               |
| 8      |                        |                            |  |                               |
| 9      |                        |                            |  |                               |
|        |                        |                            |  |                               |

Rating future impact  
of each driver –  
individual scoring



# Vermont Forest Future Future Think-Tank

## PART 2

Tuesday Jan 31, 2023

Think-Tank  
Part 2

