Global Warming Solutions Act Implementation Advisory Committee

February 26th, 2020

10am-12pm

Massachusetts Global Warming Solutions

Agenda

- 10:00 Welcome & Introductions
- 10:05 IAC Housekeeping
  - Review draft meeting minutes of 11/19/2019, Call for vote
  - Delegate form
  - Chair for Electric sector Work Group
- 10:10 Presentation from the Massachusetts Clean Energy Center
- 10:40 2050 Decarbonization Roadmap: Progress Update, IAC engagement
- 11:10 IAC Work Group Updates
  - Climate Justice Work Group Update
  - Other Work Group Updates?
- 11:40 2050 Emissions Limit
- 11:50 Wrap up and adjourn

Massachusetts Clean Energy Center

Stephen Pike

Chief Executive Officer

MASSACHUSETTS CLEAN ENERGY CENTER®

Massachusetts GWSA Implementation Advisory Committee

February 26, 2020

Presented By

Stephen Pike, CEO

OUR MISSION

Grow the economy and help meet the state's ambitious clean energy and climate goals.

AGENDA

- The Decarbonization Challenge
- MassCEC: Who we are and how we work
- History, present, and future: decarbonized buildings
- How will we contribute to net zero by 2050

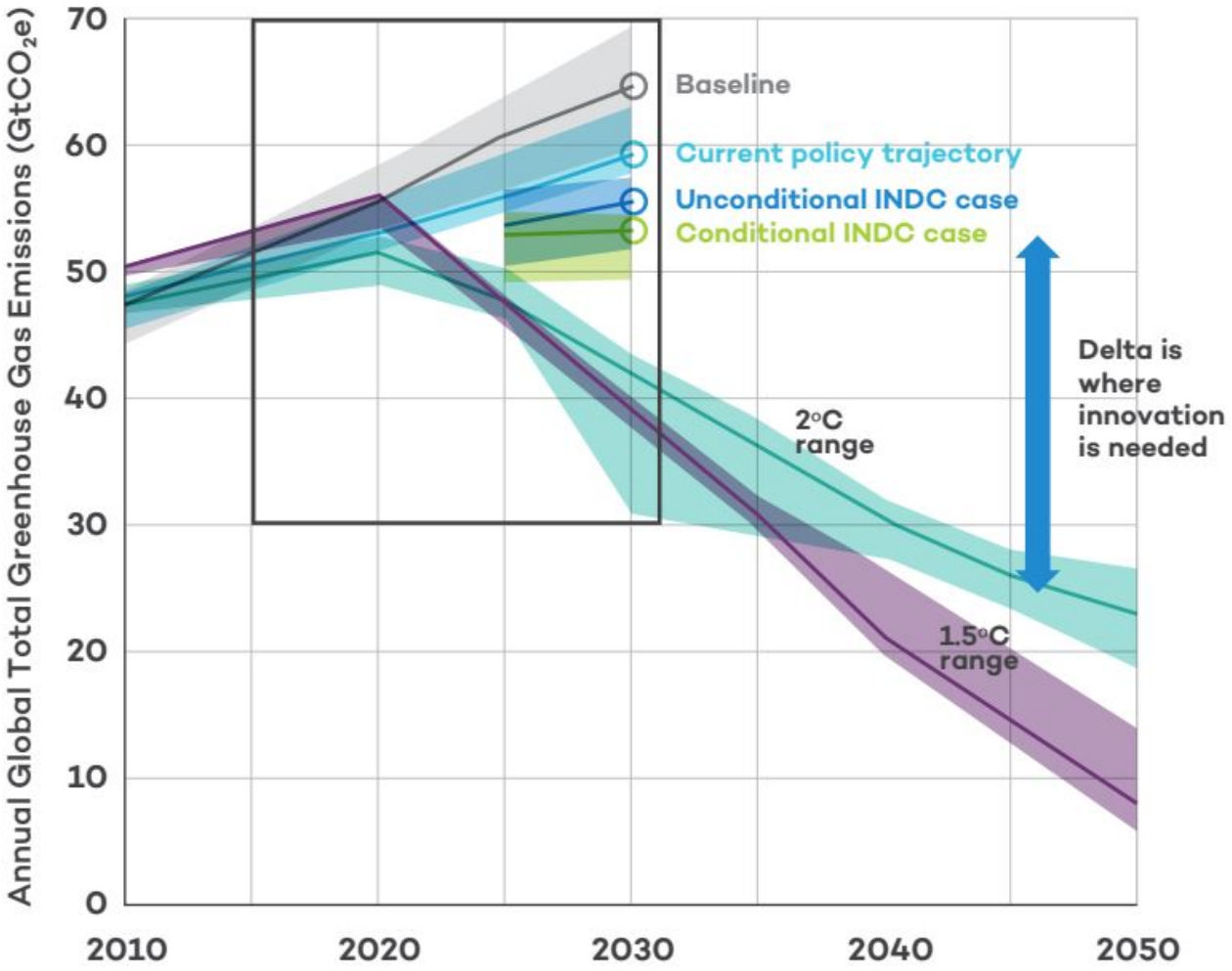
THE DECARBONIZATION CHALLENGE

WHAT DOES A DECARBONIZED ECONOMY LOOK LIKE?

"Because many of the technologies for achieving 80x50 require significant cost and performance advancement, the full Pathway beyond 2030 remains unsolved"

– National Grid, Northeast 80x50 Pathway report

DECARBONIZATION INNOVATION GAP

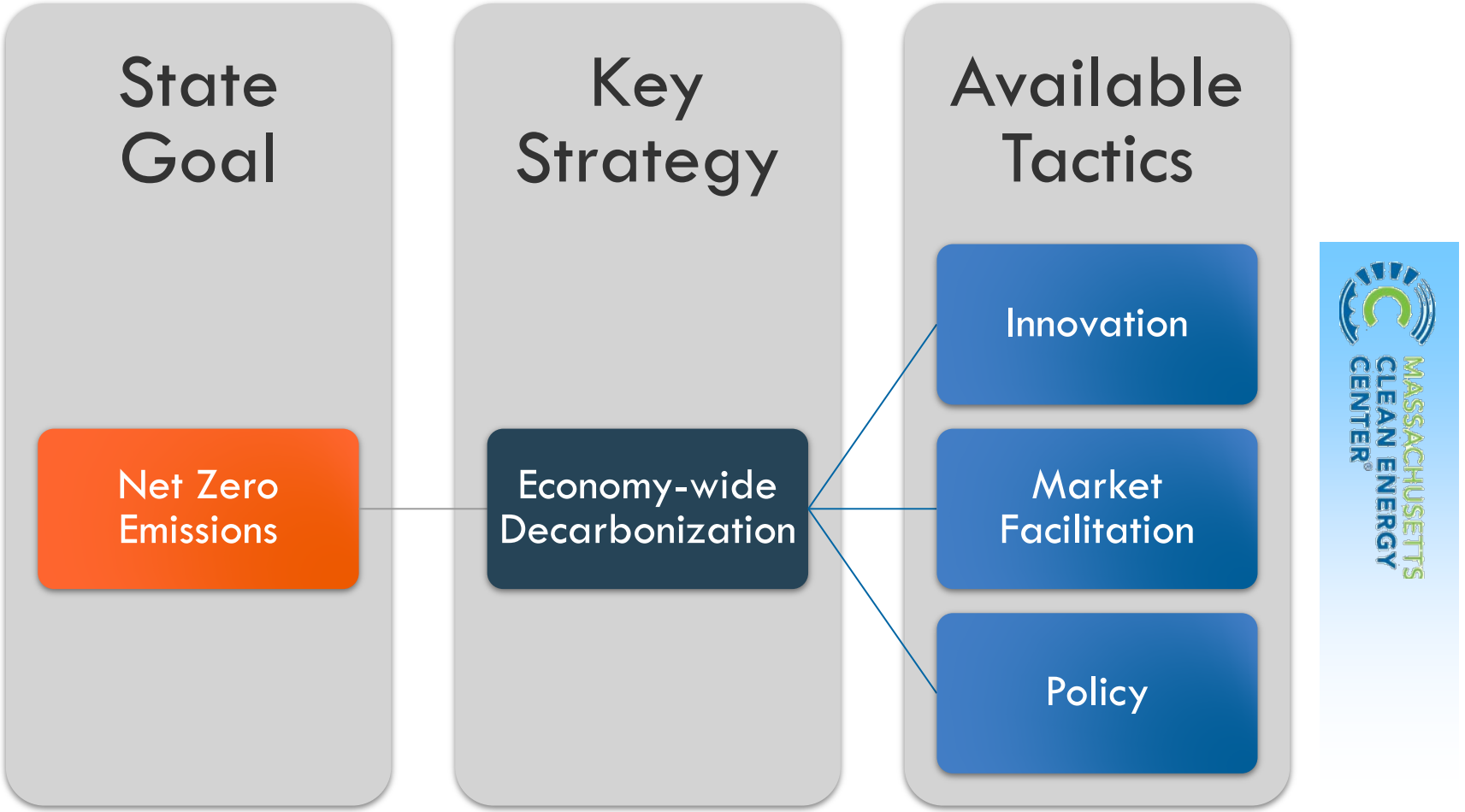


"Incremental and breakthrough innovations must be developed to meet the challenges of deep decarbonization, including the rising marginal costs of GHG abatement."
- Former US Dept of Energy Secretary Ernest Moniz

"The economic rationale for public spending on innovation is well known. Without government intervention, competitive markets under-incentivize private investment in the development and diffusion of new technologies." –Jacquelyn Pless, Cameron Hepburn & Niall Farrell, Nature Energy, 2020

"Based on the… model, we recommend policymakers to adopt balanced innovation and deployment policies. A portfolio of policies is more likely to successfully drive environmental change than a single policy." - Noah Kittner, Felix Lill & Daniel M. Kammen, Nature Energy, 2017

MASSCEC DELIVERS INNOVATION AND MARKET FACILITATION



MASSACHUSETTS
CLEAN ENERGY
CENTER®

MASSCEC: WHO WE ARE AND HOW WE WORK

4 KEY ROLES IN MASSACHUSETTS CLIMATE & CLEAN ENERGY LANDSCAPE

Policy Frameworks

Legislature/EEA/DOER/DEP

What do we need to do?

Establishes long-term goals and set policies to help achieve those goals (e.g., Net-zero by 2050; 3200 MW of Offshore wind by 2035; Renewable Portfolio Standards)

Market Facilitation

MassCEC

How do we do it?

Tests and generates on-the-ground solutions by enabling private sector, universities, nonprofits and public entities to explore new methods of achieving goals and implementing policies (e.g. funding prototype development; demonstrate new technologies in real world environment; identify/remove market barriers)

Regulate Utilities

DPU

Who is going to pay for it & how much?

Works to ensure reliable electricity service at lowest possible cost. Reviews utility plans and determines how much the utilities can charge for a particular product, investment or service.

Implement Proven Solutions

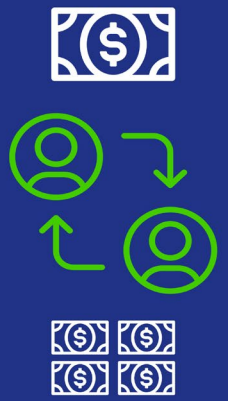
Utilities/Mass Save

How do we distribute solutions to as many electricity customers as possible?

Once solutions are identified and proven, utilities, Mass Save and private sector administers at scale. (e.g. home energy audits, rebates for insulation and high efficiency appliances)

MASSCEC IMPACT

For every $1 MassCEC has invested in local clean energy companies and academics, third parties have invested $9 in those same companies and projects.



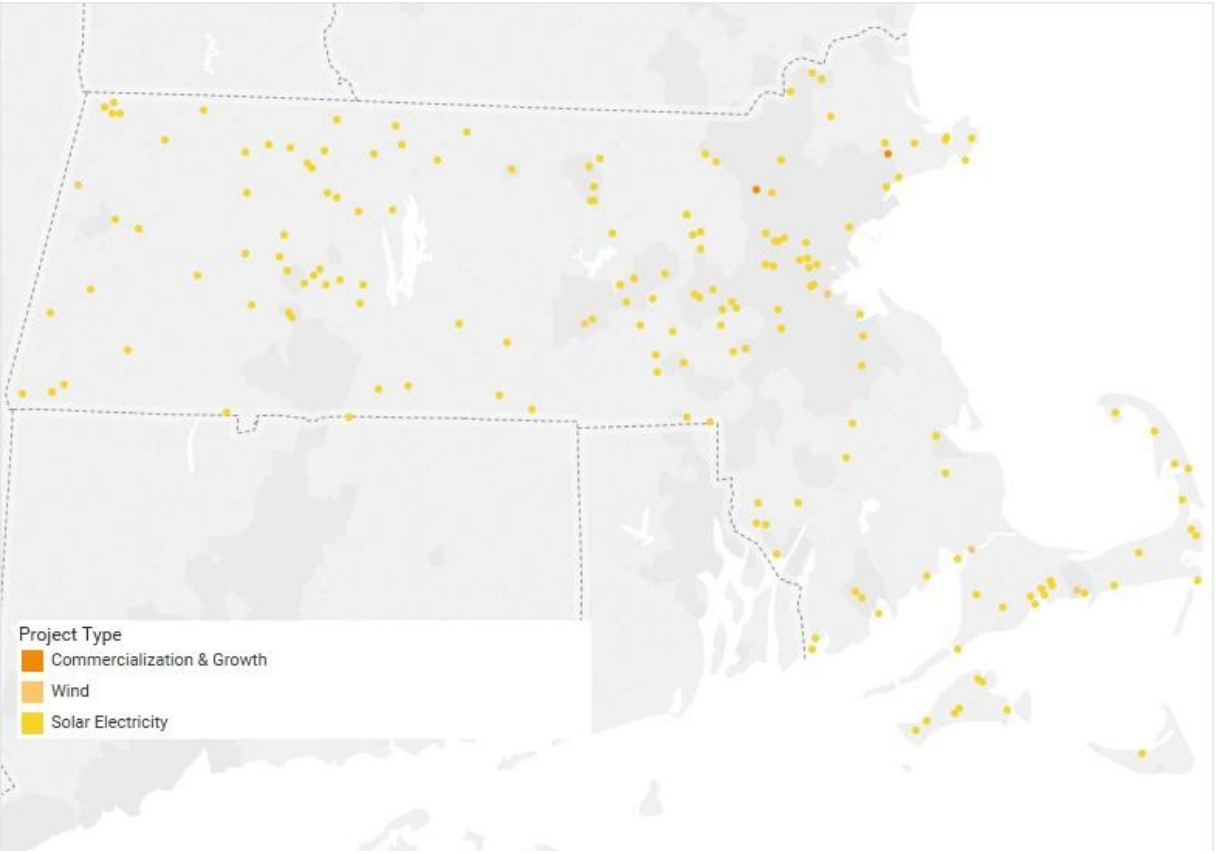
For every $1 MassCEC has provided in direct support to residents, businesses and communities, third parties have invested $4 in those same systems.

Over the last 10 years, MassCEC has awarded over 3,640 internships at 467 unique employers

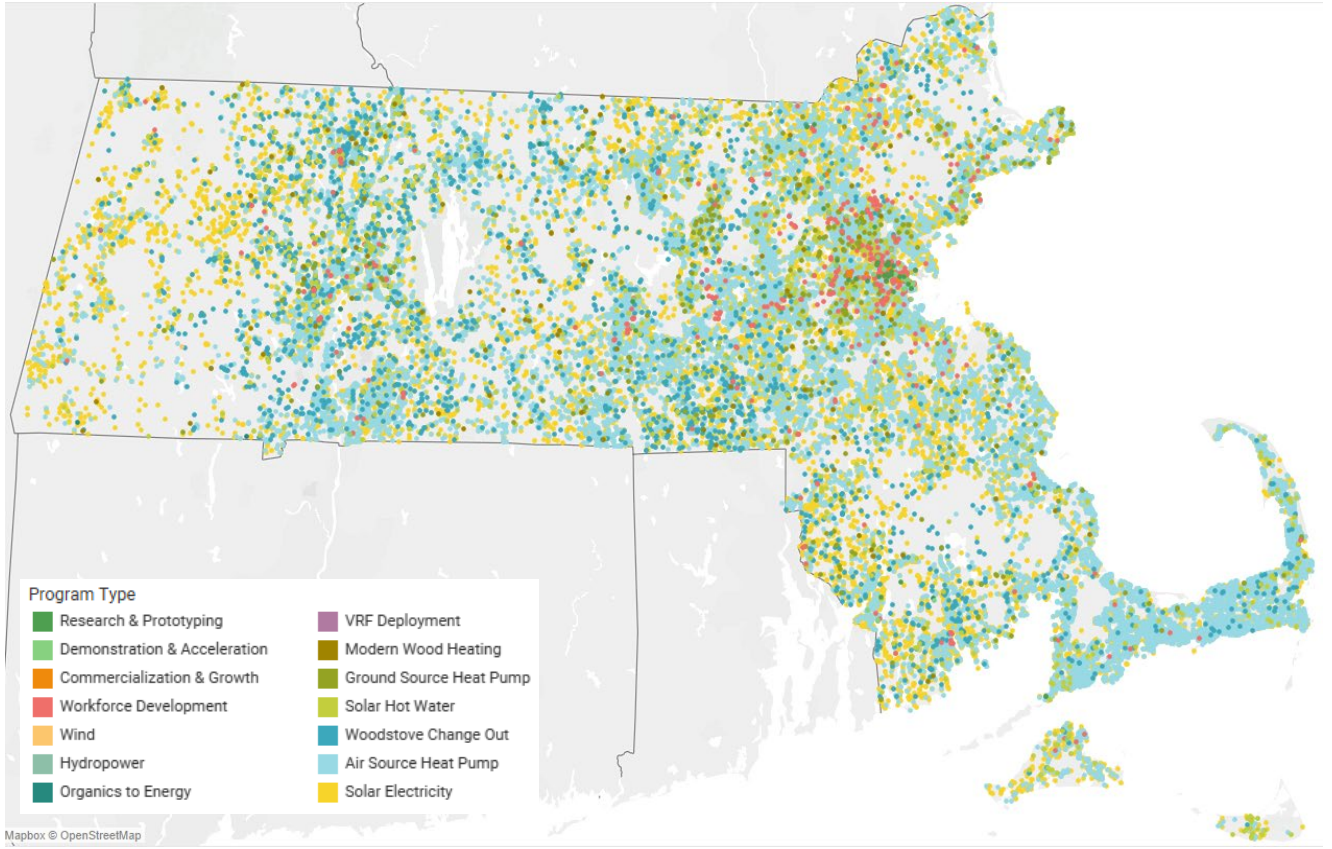
MassCEC has supported over 46,000 clean energy systems, which avoided over 275,000 metric tons of CO2 just in the last year.

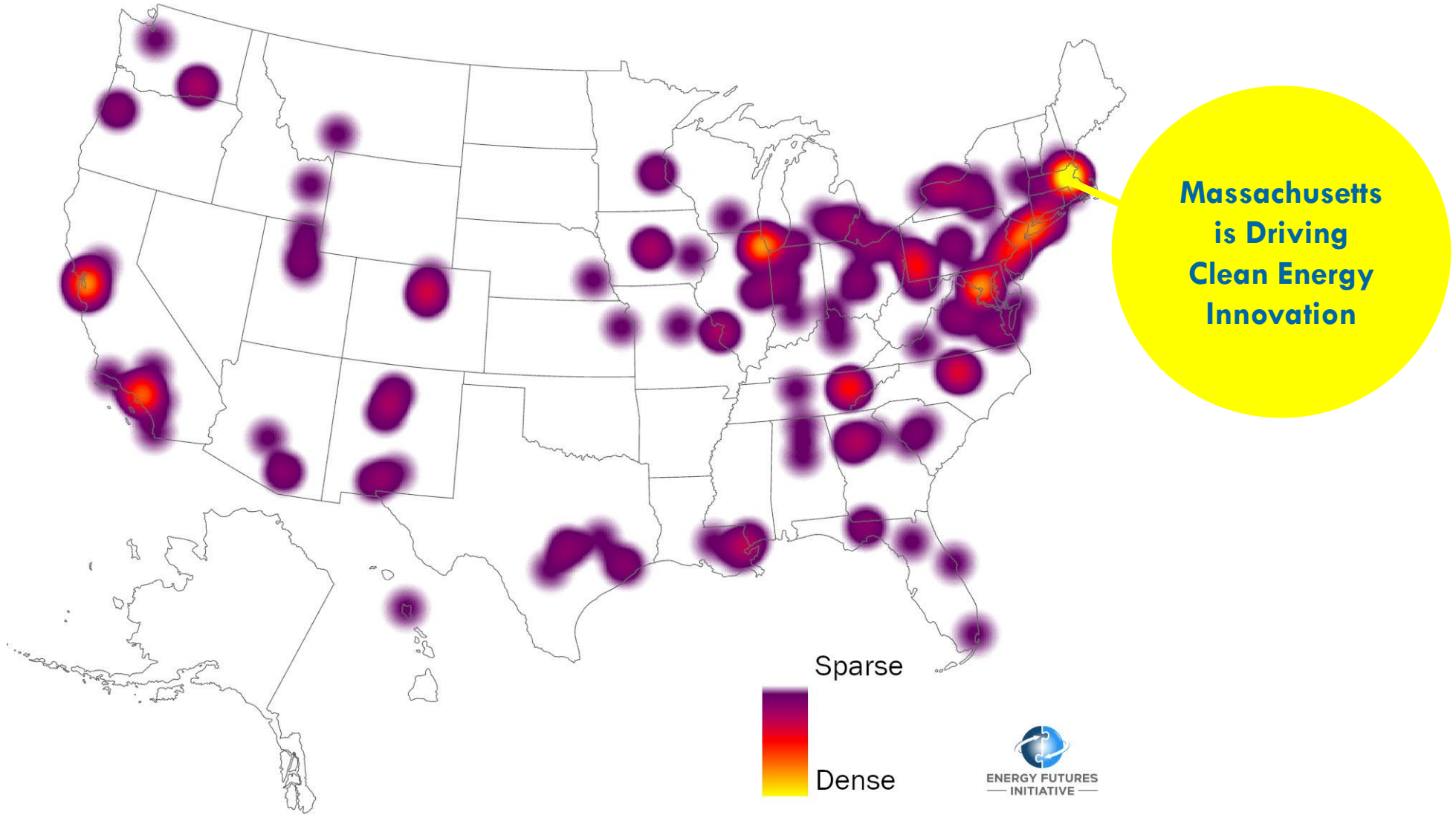
MASSCEC HAS MADE A LASTING IMPACT

CLEAN ENERGY PROJECTS 2008

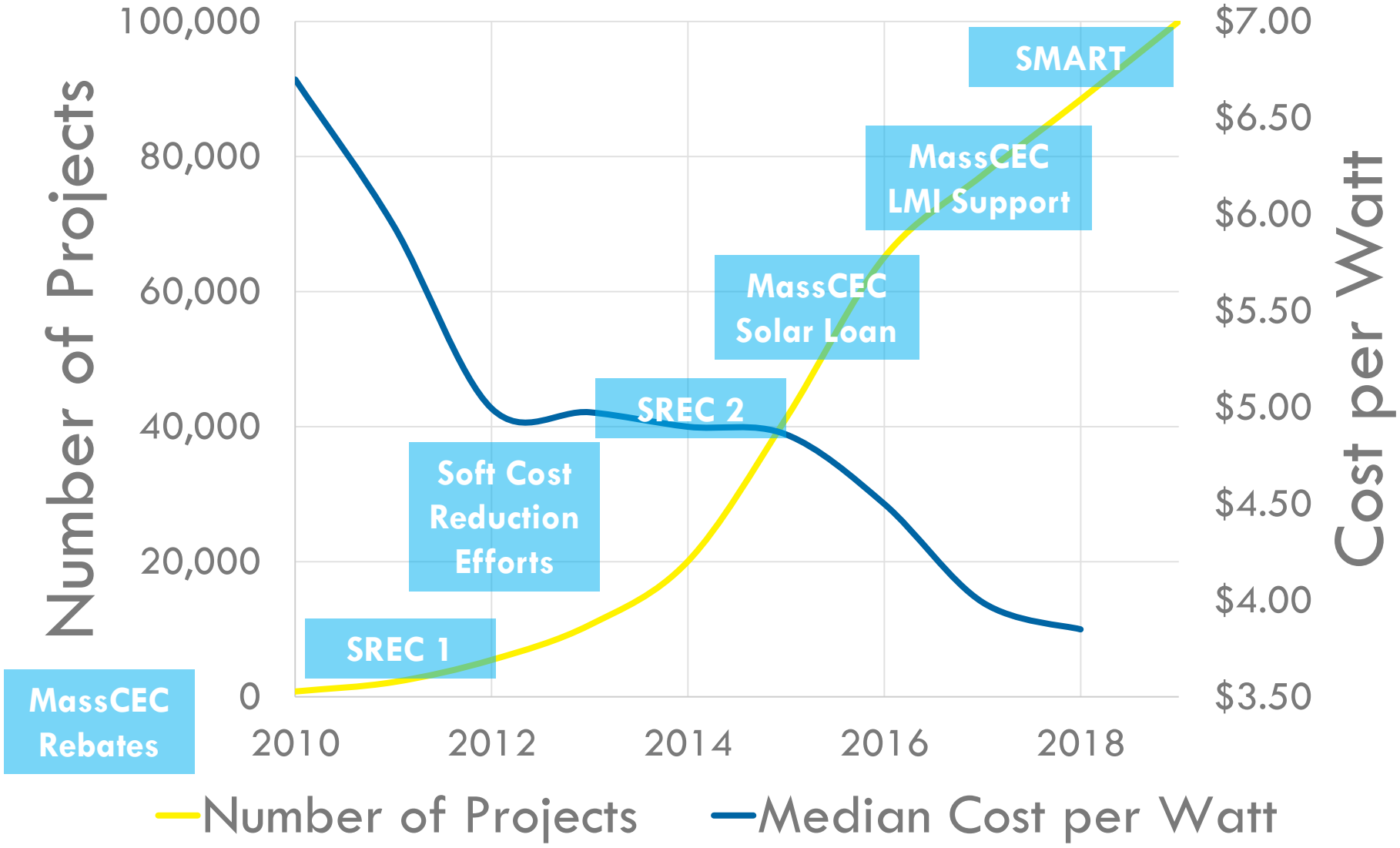


MASSCEC SUPPORTED CLEAN ENERGY PROJECTS 2019




Massachusetts is Driving Clean Energy Innovation
Sparse
Dense
ENERGY FUTURES INITIATIVE

MASSCEC'S SUPPORT OF SOLAR HAS GARNERED RESULTS



MASSCEC KICKS OFF DRAMATIC MOVE TO PASSIVE HOUSE

Passive House is the most efficient building standard in the world, using 40%+ less energy than traditional new buildings

2017
- First multi-family Passive House project in MA (28 units)

2018
- MassCEC funds 8 multi-family affordable housing projects

2019
- Mass Save launches incentive program for multi-family Passive House construction

2020
- MA housing agency adds points for Passive House in tax credit program

Passive House Program Results

8 Projects 540 units

15 developers and architects

5,400 units considering Passive House certification

$1.8 million invested

Informed 2 state Passive House incentive programs

MASSACHUSETTS CLEAN ENERGY CENTER

mass save

dhcd Massachusetts

MASSCEC FOSTERS INNOVATION : CATALYST

The Catalyst Program awards grants of up to $65,000 to cleantech startups and researchers in Massachusetts

2010
- MassCEC runs the first round of the Catalyst program

2012
- Catalyst receives more startup than university applicants for the first time

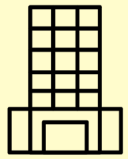
2012-14
- MassCEC builds suite of innovation programs based on success of Catalyst

2020
- Massachusetts leads nation in cleantech innovation

Catalyst Results

111
Awards

191
Employees Hired



92%
companies still active

$6M Awarded

MASSACHUSETTS CLEAN ENERGY CENTER

$205M Follow On Funding

MASSCEC SUCCESS STORY: energysage

Innovation → Market Transformation

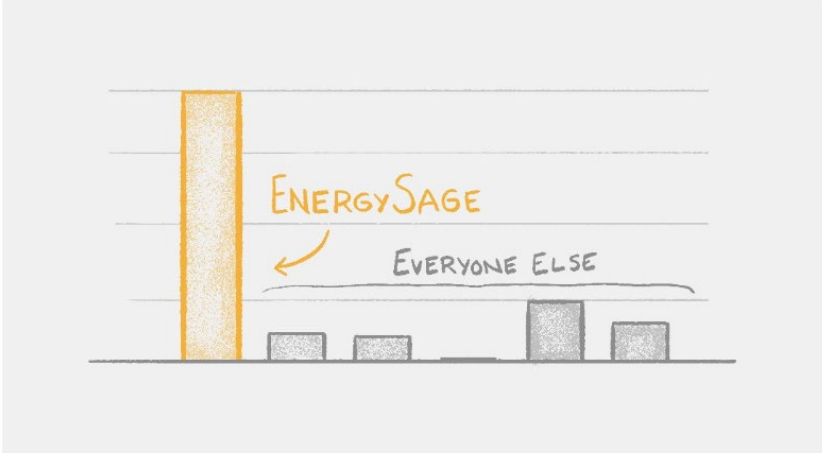
- Boston-based startup company
- "The Expedia of Solar": enables comparison shopping for solar online
- Received MassCEC grants and investment from 2013 through 2019
- Achieved 2% market share in 2019
- Over $130M of solar transactions on the platform, resulting in >250,000 tons of CO_2 avoided to date
- Operational in 30 states
- Partnerships with multiple utilities

Total MassCEC support: $1.8M

Overthink group

EnergySage: How They Became the Definitive Online Marketplace for Solar Panels

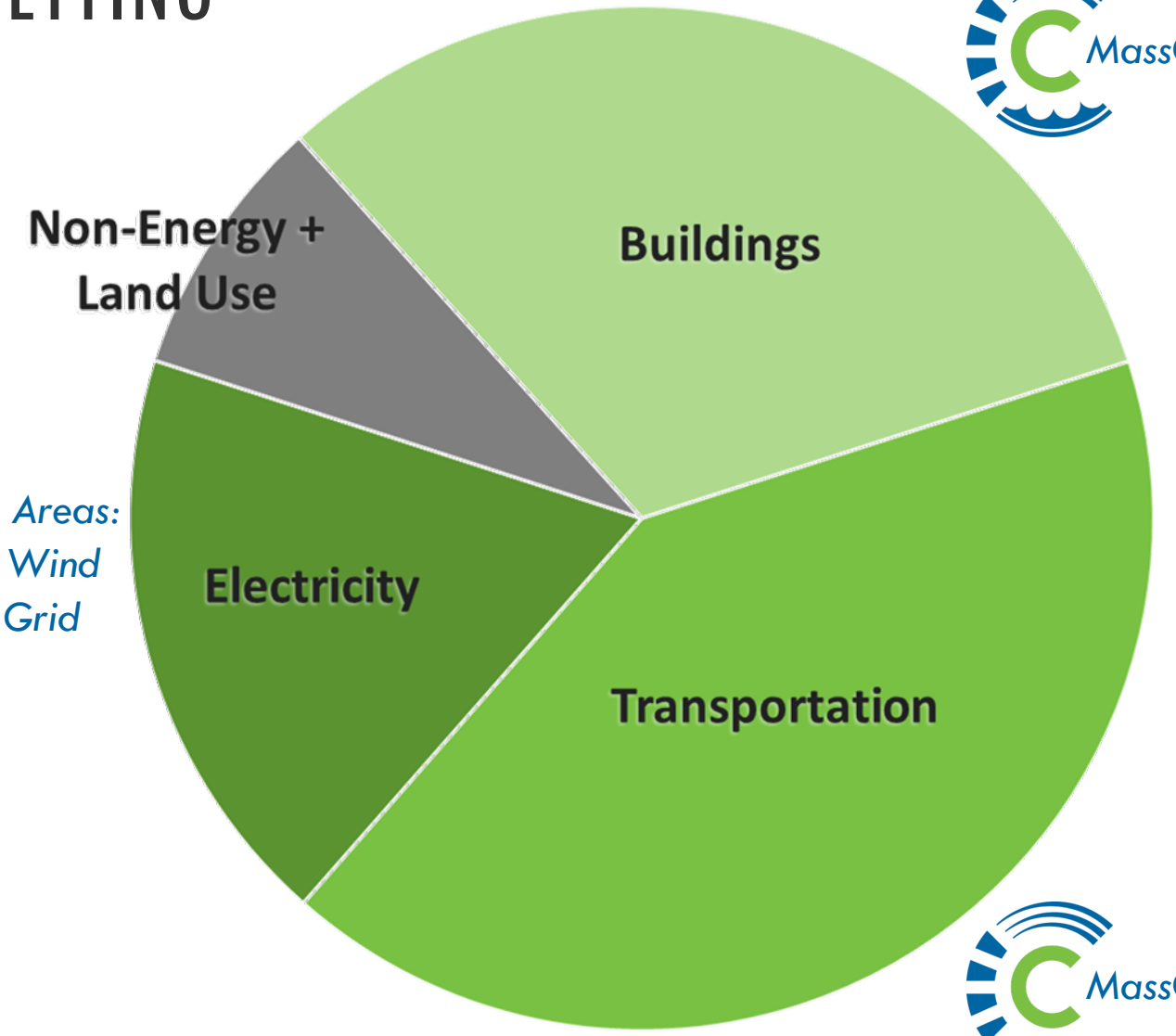
by Ryan Nelson | Mar 23, 2019 | Teardown | 0 comments



MASSCEC'S FOCUS: GETTING TO NET ZERO

Massachusetts GHG emissions, 2017: 73 million metric tons

MassCEC Pillar Areas:
- *Offshore Wind*
- *Net Zero Grid*



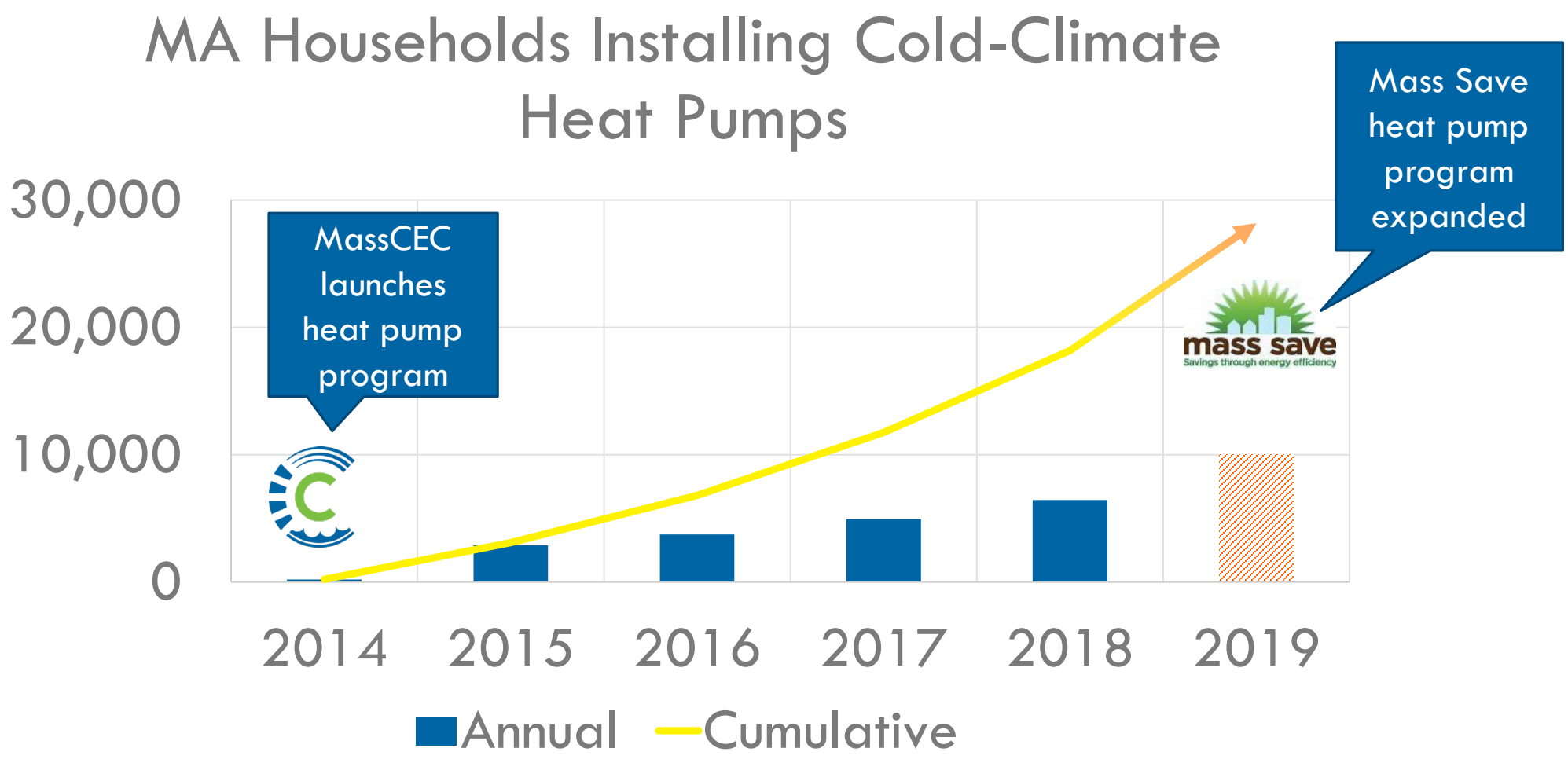
MassCEC Pillar Area

MassCEC Pillar Area

DECARBONIZED BUILDINGS

Past, Present, and Future Work

MASSCEC JUMP STARTED HEAT PUMP MARKET

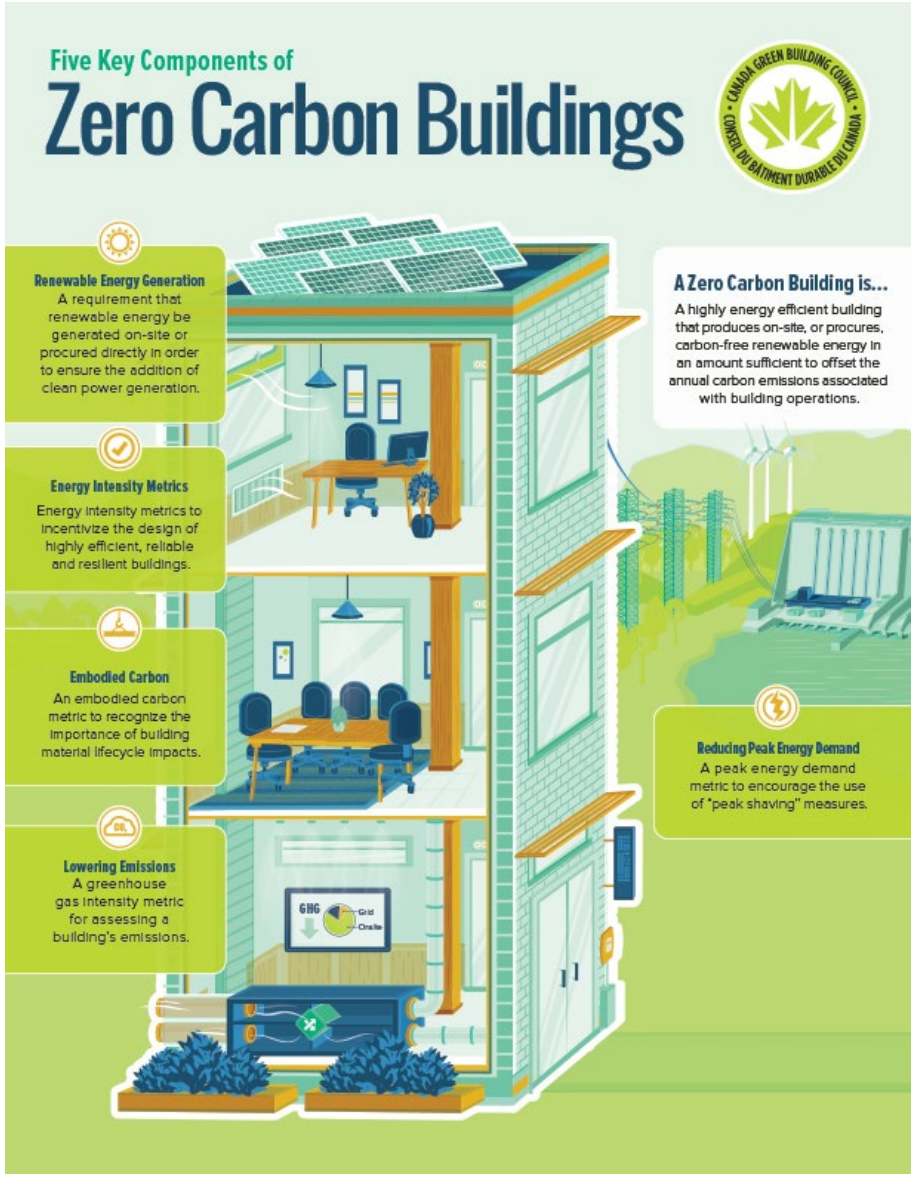


BUILDINGS: NET ZERO BY 2050

We will need to do more than just heat pumps!

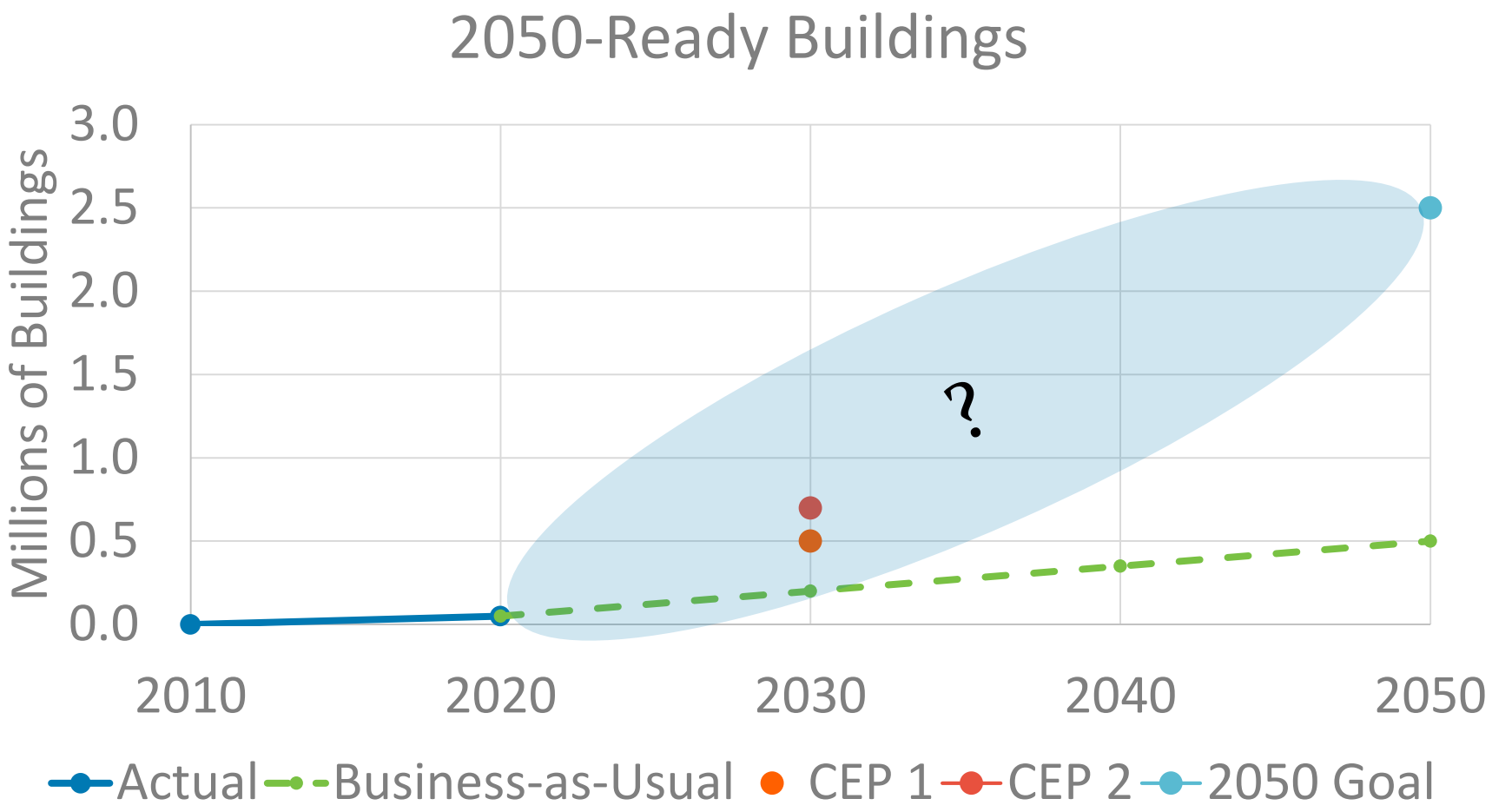
Zero emissions by 2050 for the state's 2.5+ million buildings may mean:

1. Deep weatherization
2. All heating, hot water, and appliances transitioned to electric
3. 100% clean grid electricity



BUILDINGS: A LONG WAY TO GO BY 2050

- MA in very early stages of deep weatherization and electrification of buildings
- 2.5+ million buildings need to be transitioned in 30 years
  - ~85,000 per year
- Natural upgrade opportunities infrequent
- Decisions today have long-lasting impacts



2050 BUILDING DECARBONIZATION: DIAGNOSIS AND PRESCRIPTION

Target sub-sector: existing small multi-family, rental, residential buildings

Decarbonization Market Challenge/Barrier	MassCEC Tactical Response(s) and Solutions
Insulation and air sealing materials and methods exist, but are not cost effective and difficult to deploy	Support technology innovation and demonstrate to identify scalable, cost-effective solutions
Owners have little to no incentive to invest in upgrades that primarily benefit tenants: “landlord tenant split incentive”	Support green lease language development and market demonstration
Bldg. owners secure EE, RE, and EV services and incentives from different vendors/entities; private sector uninterested in retrofit project finance due to lack of replicable models	Technical and financial business model demonstration of “package deal” for building owners to inform market adoption and MassSave incentive design
Difficult to navigate transition from existing building equipment and conditions to 2050 compliant equipment	Development of customer decision making roadmap to inform cost- and sequence-optimized transition
Embodied carbon in building retrofit products (insulation) and equipment (heat pumps) must be addressed	Support technology innovation embodied carbon reduction best practices via demonstration projects

DECARBONIZING BUILDINGS INTO THE FUTURE

- [Note: this bullet was omitted in original 2/26/2020 presentation] Continue development of next generation technologies
- Develop comprehensive and cost effective system-level decarbonization solutions for all building types
  - What is the optimal level of building weatherization?
  - How are next generation heating, cooling, hot water, etc. solutions designed and implemented?
  - How are all end-uses transitioned to electricity?
- Support scaling of building decarbonization
  - Enable implementation of packaged weatherization and electrification solutions for all consumers and building types starting immediately
- Engage with all building owners and occupants in an ongoing manner
  - Increase awareness of decarbonization opportunities
  - Demonstrate cost-saving, comfort, and value benefits
  - Reduce hurdles for consumers
  - Facilitate planning and implementation
- Train and develop workforce to implement these solutions

THANK YOU!

2050 Decarbonization Roadmap: Progress Update & IAC Engagement

Reminder: Study Team

Stakeholders

GWSA Implementation Advisory Committee (IAC)

Technical Steering Committee

State Agencies & Governor's Office

Focus Groups

Community Members

CADMUS

Research Team

VEIC

ARUP

Harvard Forest

Evolved Energy Research

RSG

Dr. Jonathan Krones*

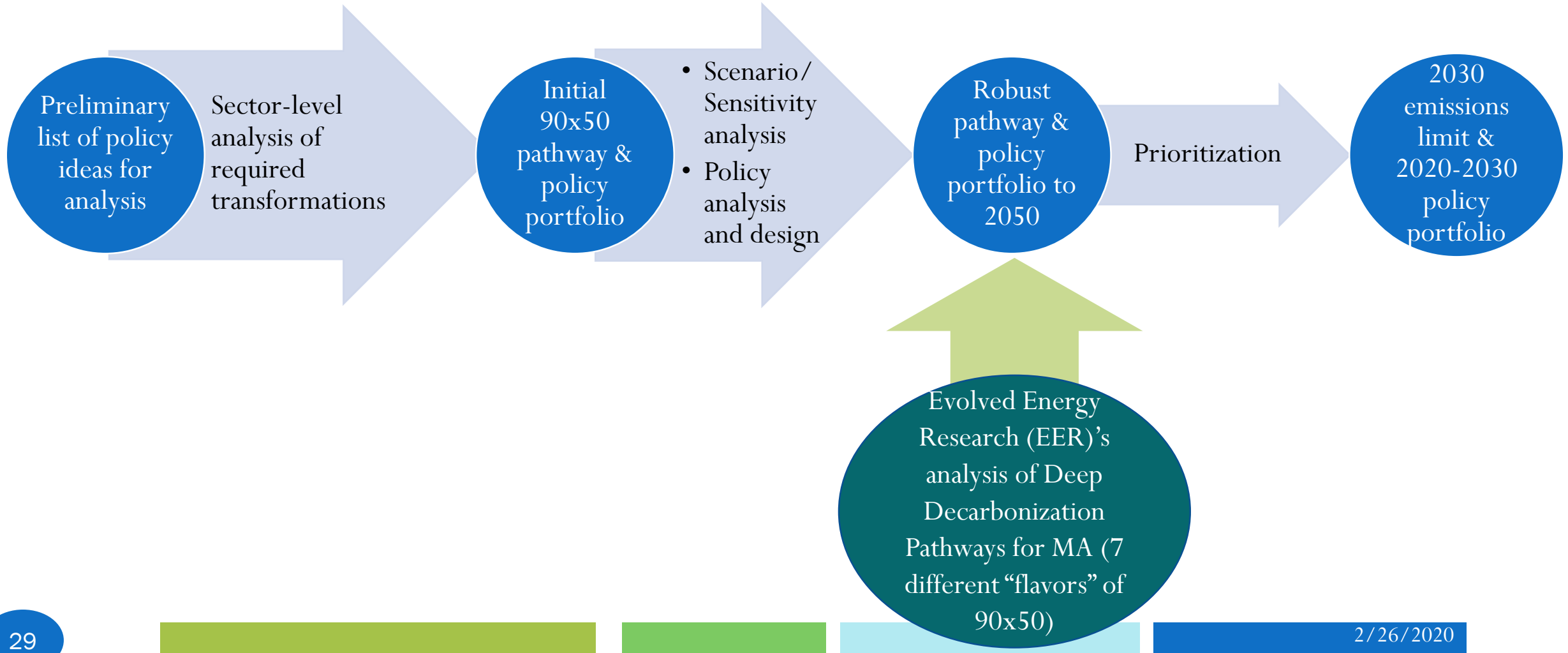
Converge Strategies

AEG

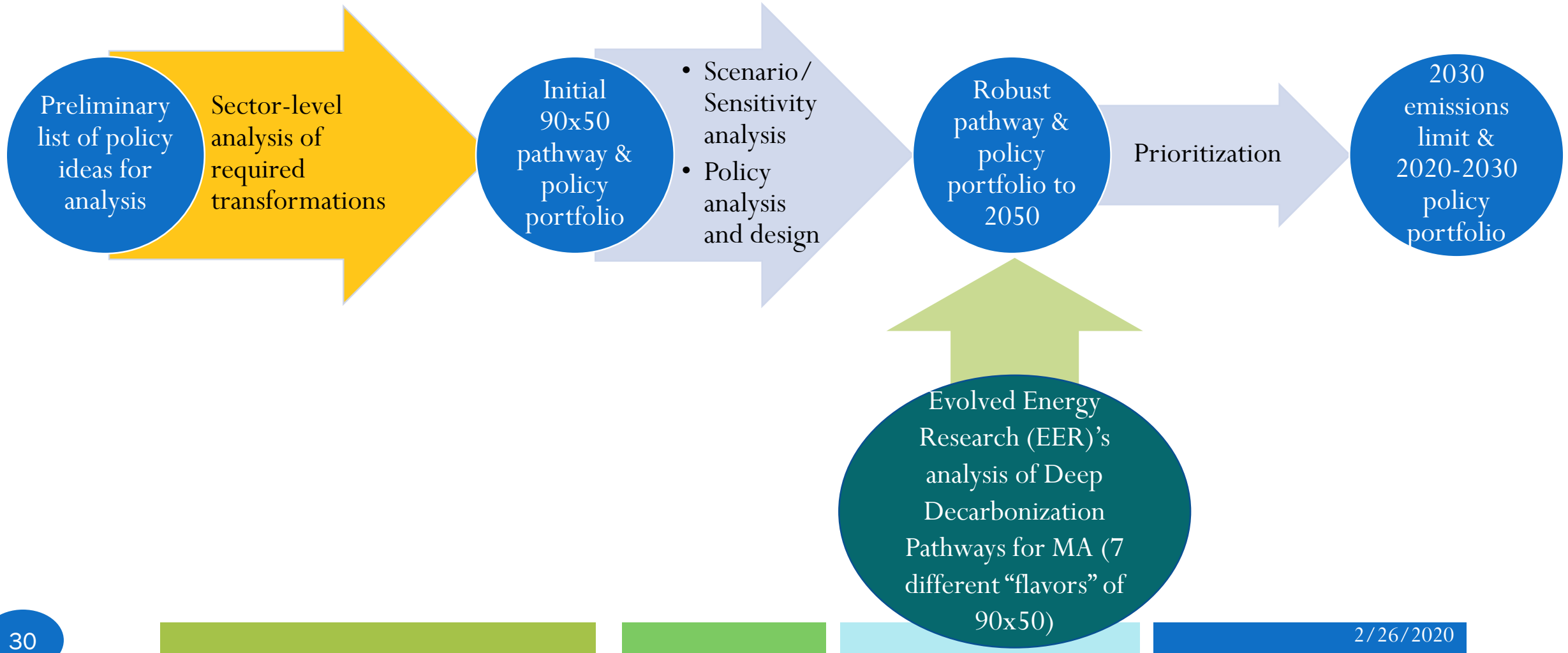
Dr. Wendy Jacobs*

*Independent Consultant

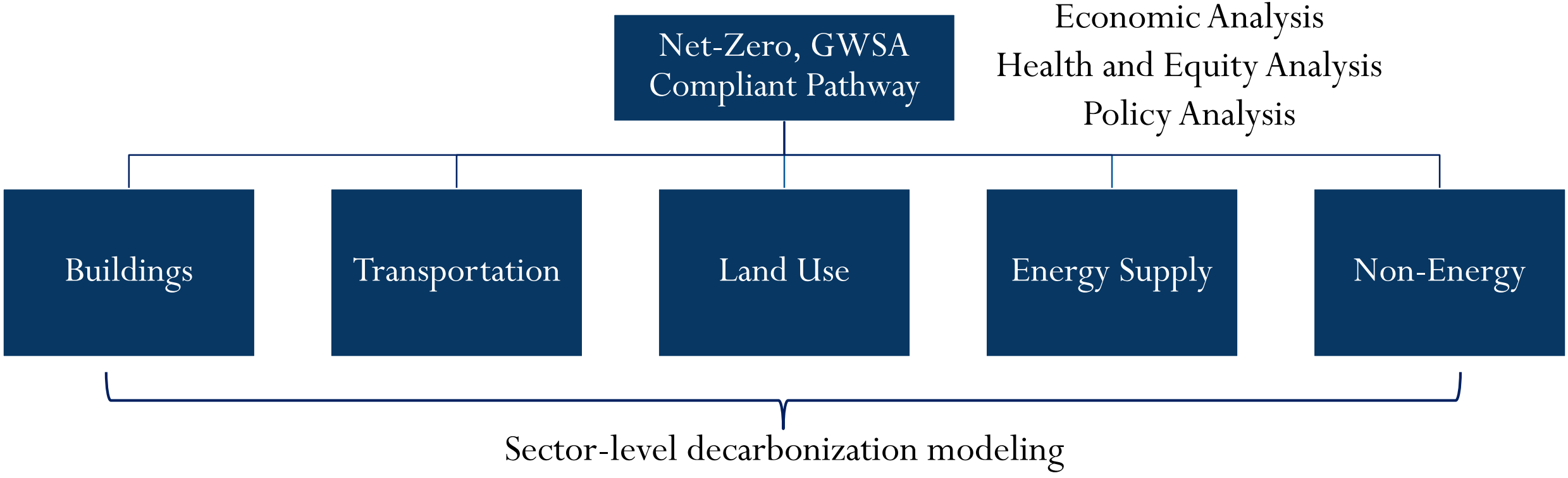
Analytical Process



Analytical Process



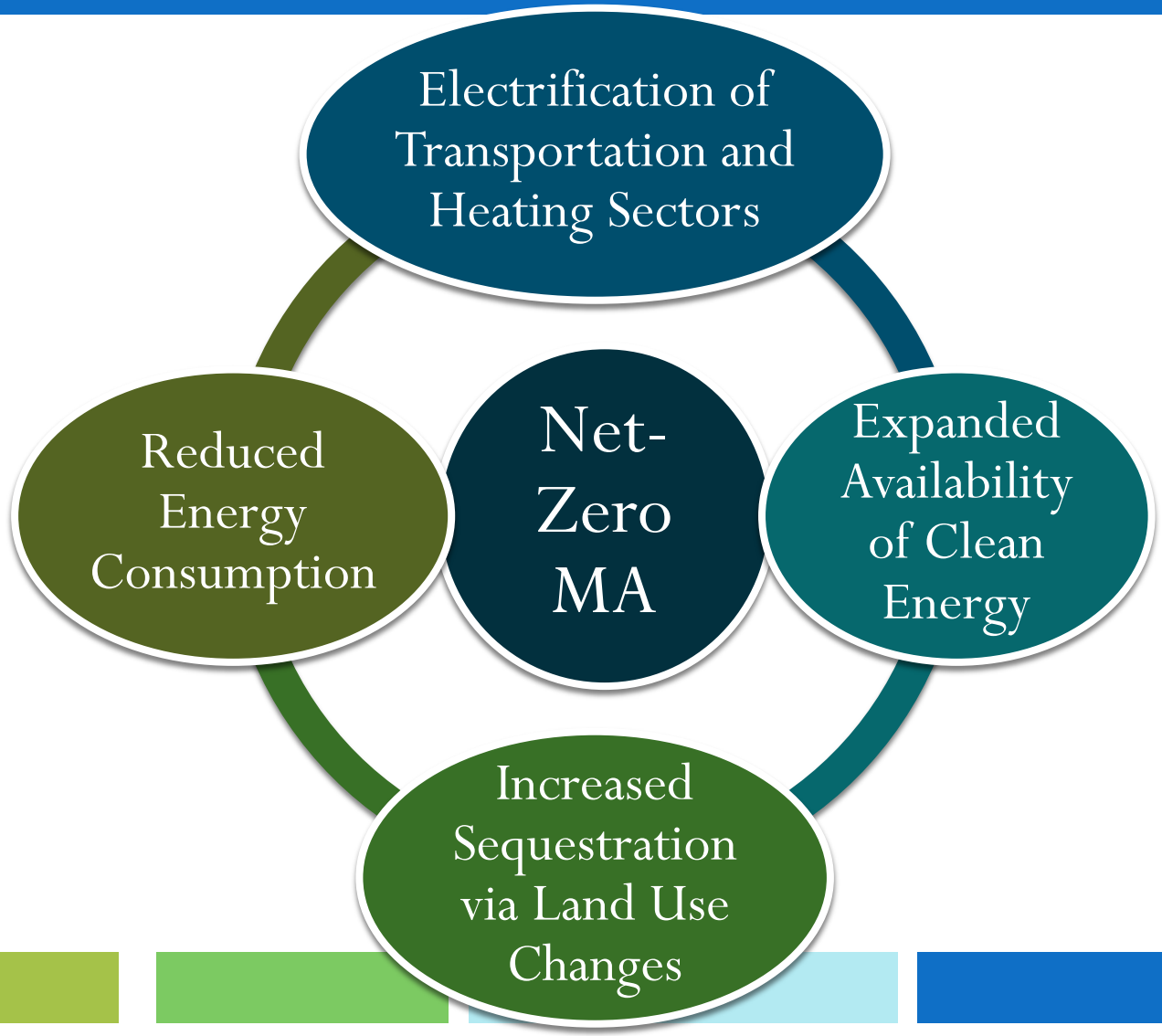
Sector-level Analysis



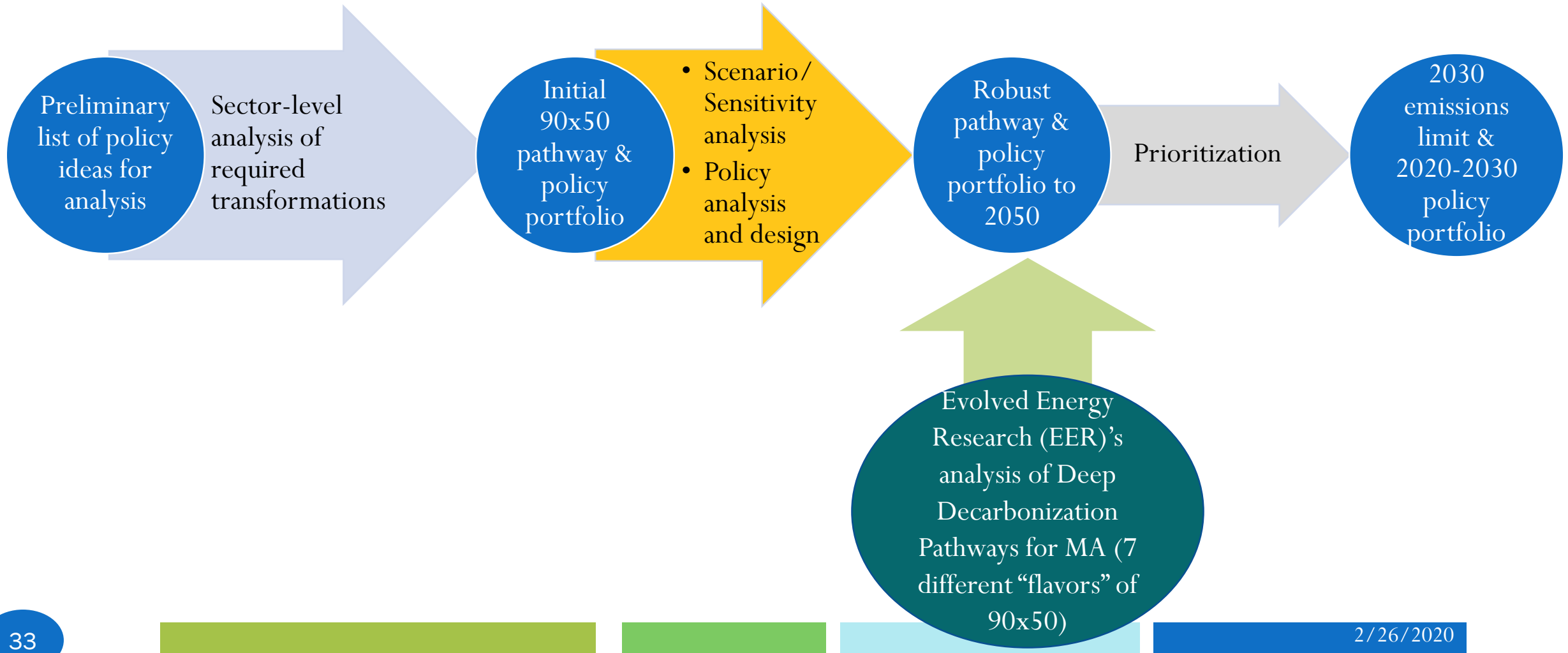
+ Similar analysis from EER balancing energy demand and energy supply in 7 different Deep Decarbonization Pathways (DDPs) to show different paths to the same goal

Modeling and Policy Analysis Aligned Around Core Pillars for Decarbonizing MA

What is the Commonwealth's long-term pathway to a net-zero target by 2050?

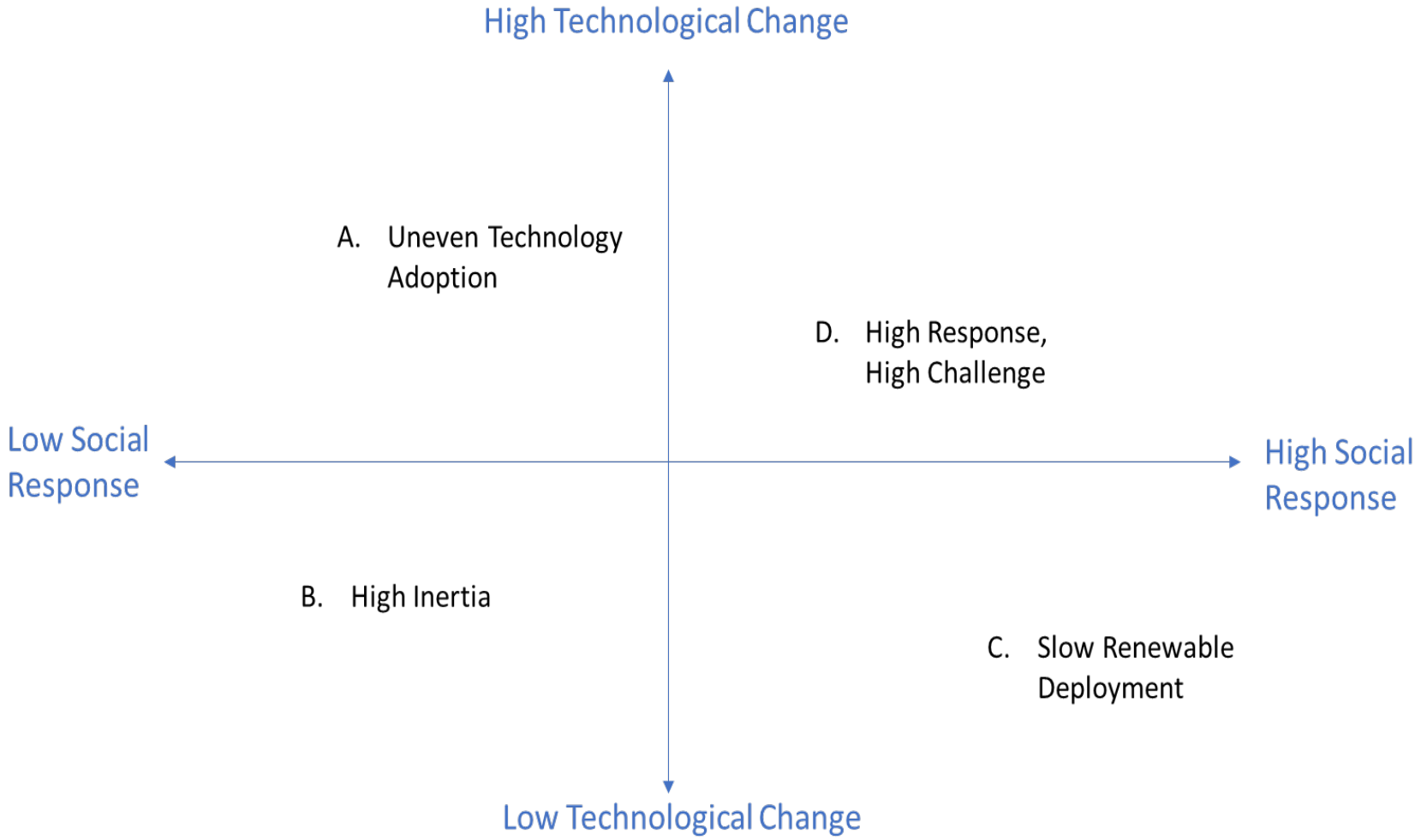


Analytical Process

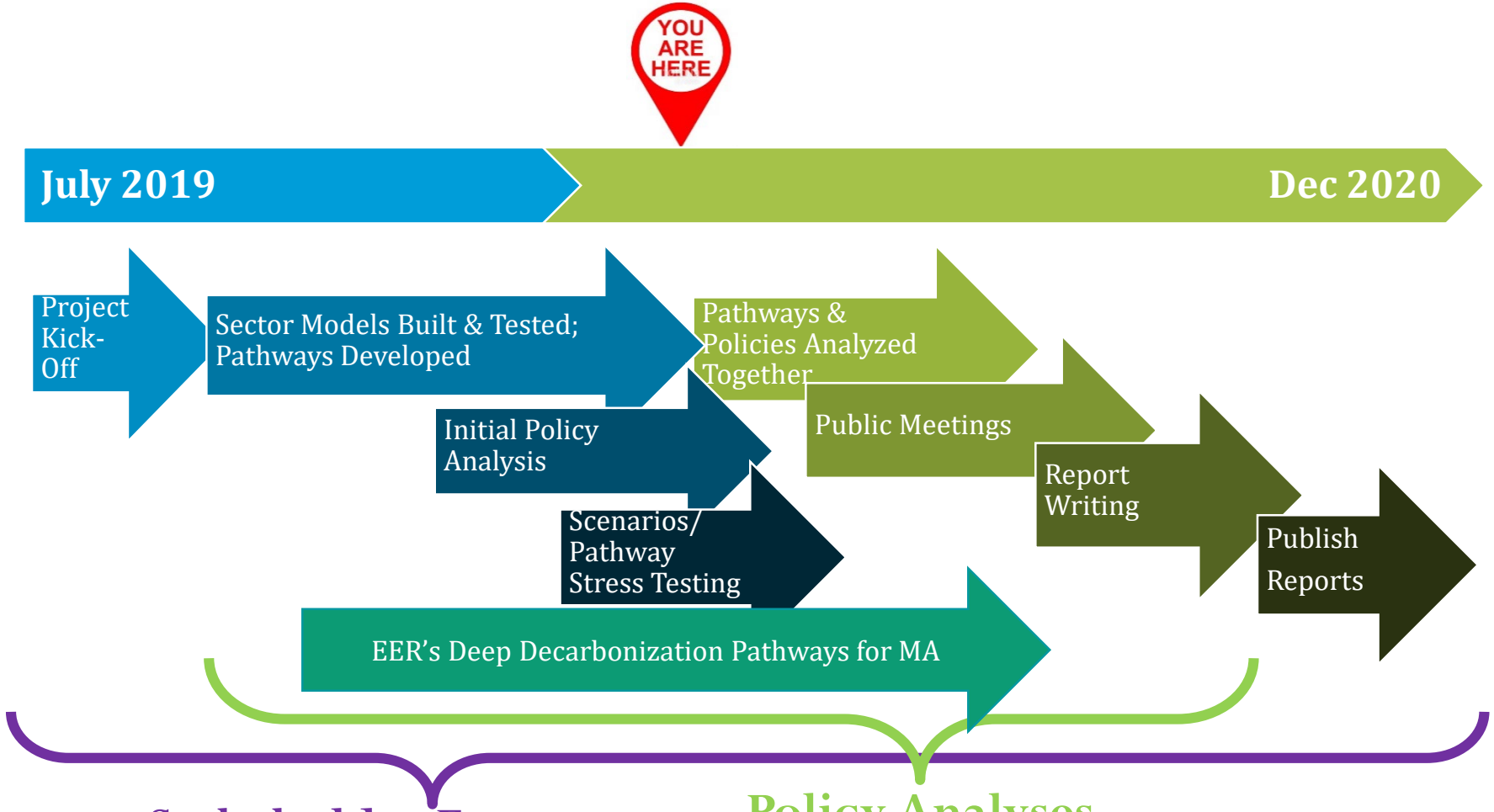


Scenario/Sensitivity Analysis

Thank you to all who contributed in the Scenario Workshop!

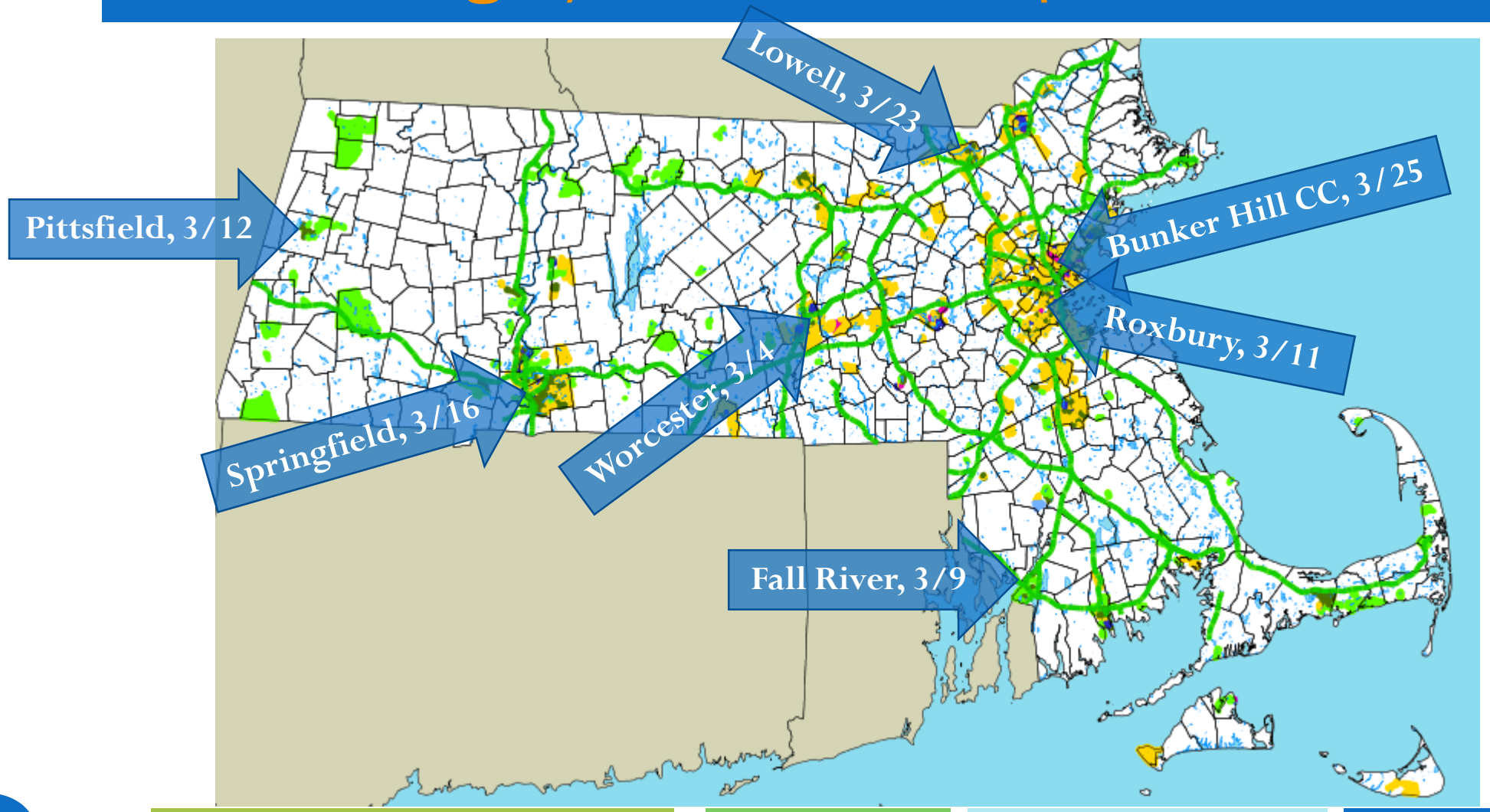


Project Timeline



2050 Roadmap Public Meetings

www.mass.gov/2050Roadmap



Proposed IAC Engagement in 2020

Jan./Feb.

- Climate Justice WG meetings on engagement & policy framework
- Full IAC meeting 2/26 on Study updates & Net-Zero Determination

May

- WG meetings on initial pathways results & policies and policy framework
- Full IAC meeting on policy framework & long-term policies for 2050

June

- WG meetings on recommended 2030 CECP policies and actions

July

- Full IAC meeting on policy analysis results & WG recommendations for 2030 CECP

Sep.

- Full IAC meeting on key take-aways from Decarbonization Roadmap to 2050 and preview draft 2030 CECP policies

Dec.

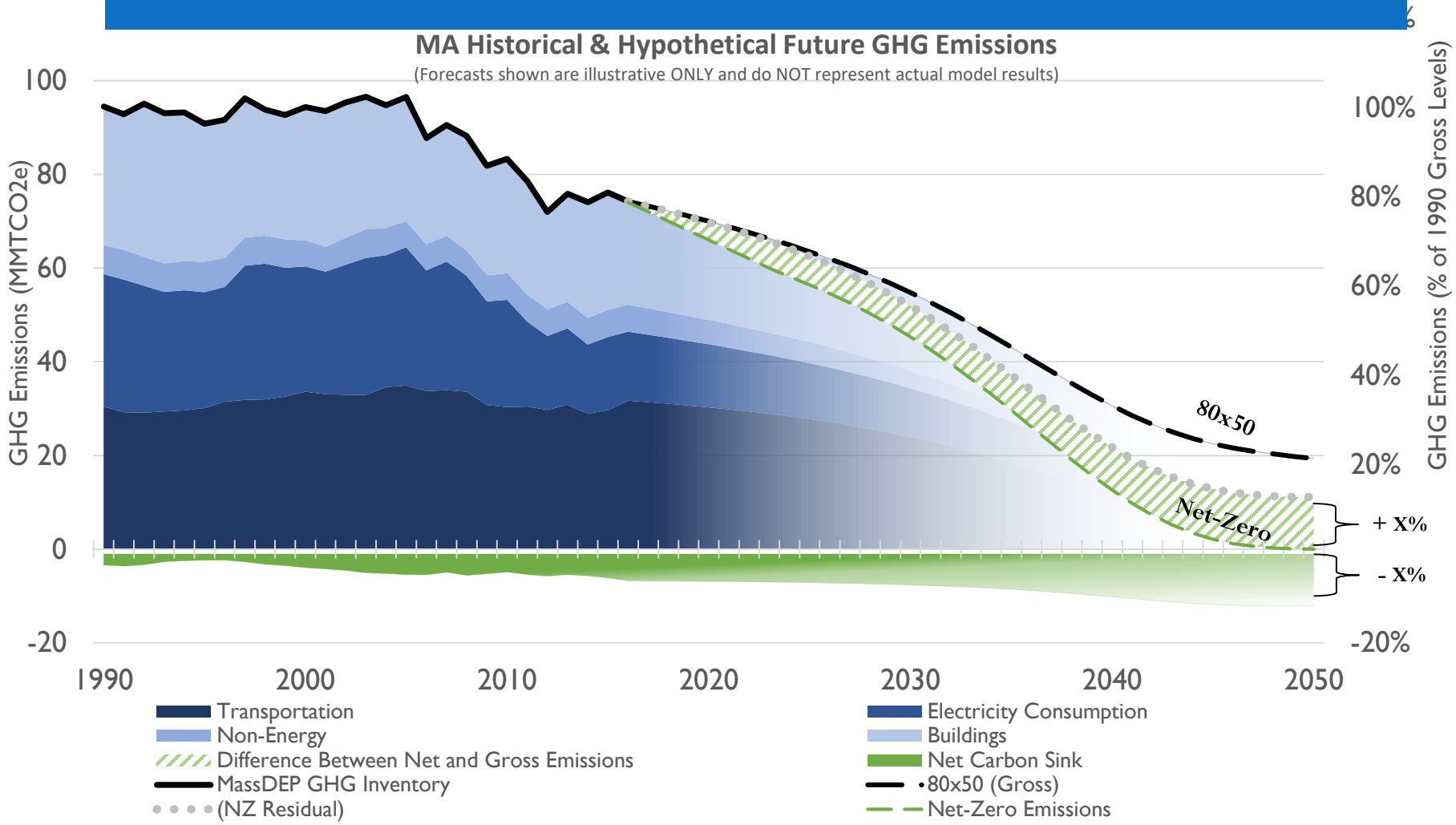
- Full IAC meeting on draft workplan for 2021, focusing on policy implementation and progress tracking

IAC Work Group Updates

IAC Climate Justice Work Group Update

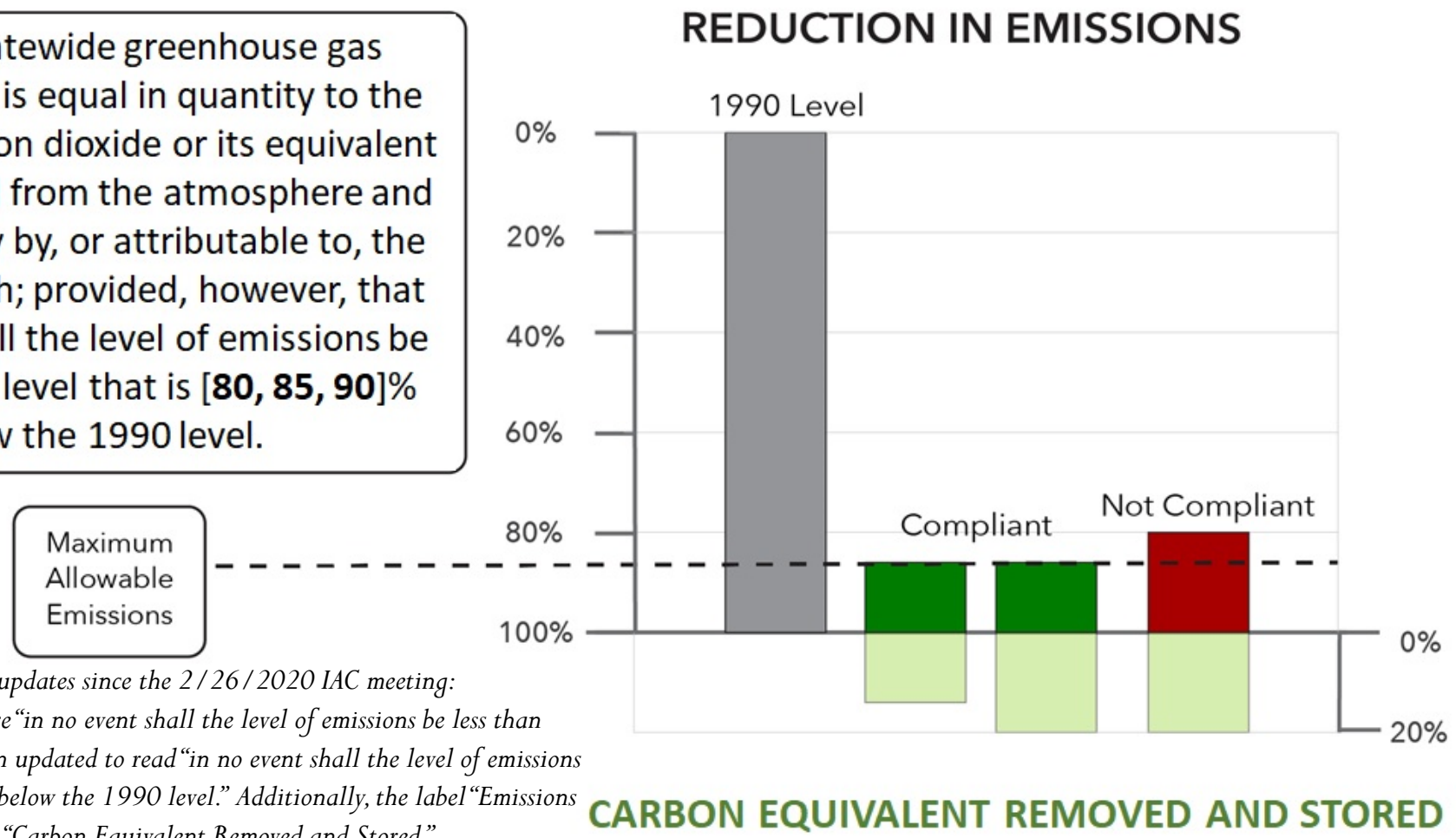
2050 Emissions Limit

What is Net-Zero?



2050 Emissions Limit: Submit Comments at www.mass.gov/2050Roadmap by 4/10/2020

A level of statewide greenhouse gas emissions that is equal in quantity to the amount of carbon dioxide or its equivalent that is removed from the atmosphere and stored annually by, or attributable to, the Commonwealth; provided, however, that in no event shall the level of emissions be greater than a level that is [**80, 85, 90**]% below the 1990 level.



Note: The graphic on this slide has two minor updates since the 2/26/2020 IAC meeting: There was a typo in the draft text, so the phrase "in no event shall the level of emissions be less than [80, 85, 90]% below the 1990 level." has been updated to read "in no event shall the level of emissions be greater than a level that is [80, 85, 90]% below the 1990 level." Additionally, the label "Emissions Removed and Stored" has been updated to read "Carbon Equivalent Removed and Stored."

Wrap up and adjourn

- Delegate forms
- www.mass.gov/2050Roadmap
  - Public meeting details
  - Comments on 2050 Emissions Limit: submit by 4/10
- Next IAC meeting: May, 2020