# Instrument Choice for Adaptive Regulation of Emerging Technologies

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Highly dynamic technologies offer great promise,

But also perils.



EXCLUSIVE
INVESTIGATION FOCUSED ON TESLA AUTOPILOT

# Why adaptive regulation?

Fast pace of change

+

High levels of uncertainty

→

Dynamic Regulatory Net Benefits Profile

Ill-suited to a one-time regulatory approach.

# What do we mean by adaptive regulation?

A regulatory process that enables learning and modification of policy over time via adjustments informed by data collection and analysis.

# Broad types of planned adaptive regulation

A regulatory process that enables learning and modification of policy over time via adjustments informed by data collection and analysis.

**Planned adaptive regulation:**
Learning and modification of policy requires direct action of the regulator after the initial regulation is promulgated.

**Intrinsic adaptive regulation:**
Learning and modification of policy is independent of the regulator after the initial regulation is promulgated.
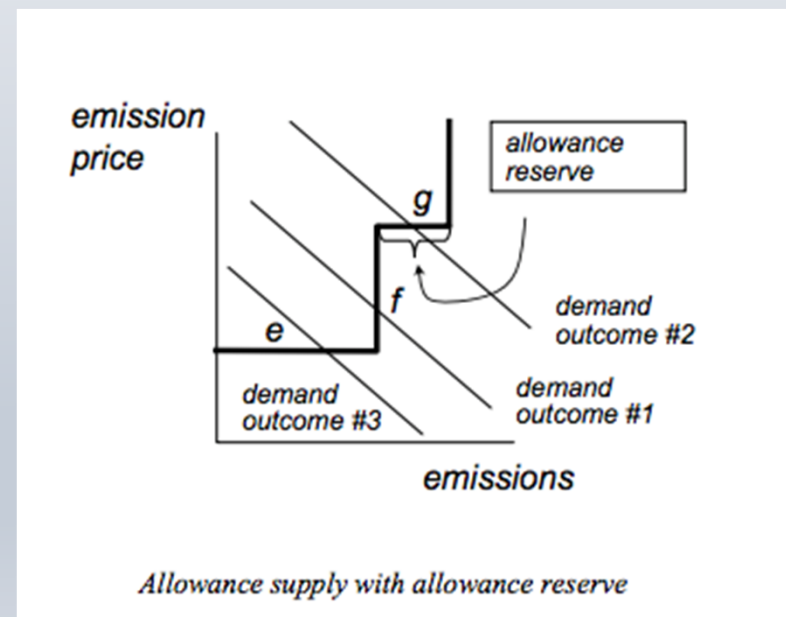
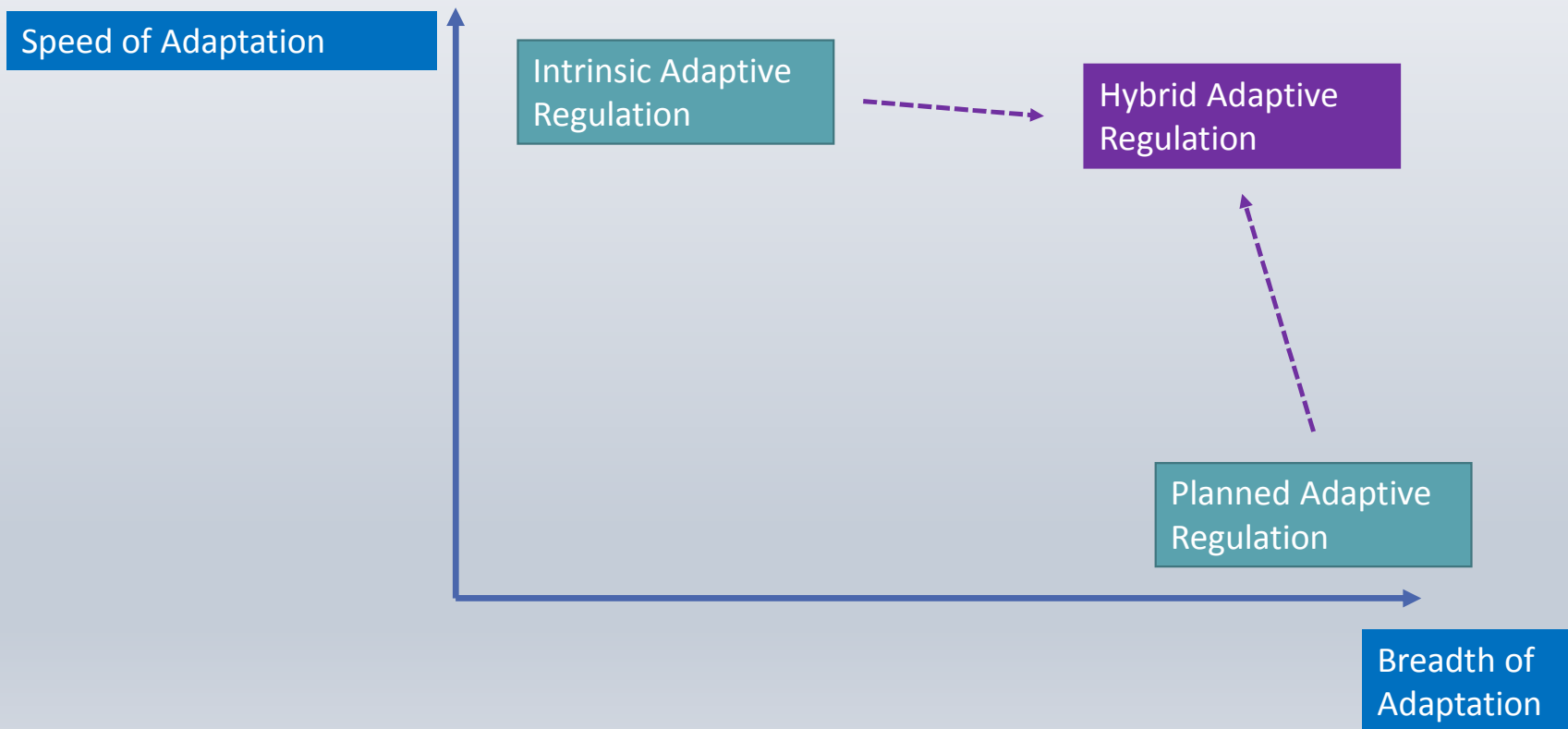# Examples of Planned and Intrinsic Adaptive Regulations

## Planned

- NAAQS
  - Must be reviewed every 5 years
  - Primarily a scientific review
  - Also conduct economic analysis as part of Regulatory Impact Analysis
  - NAAQS for Ozone, PM, SO2, and NOx have changed the most over time
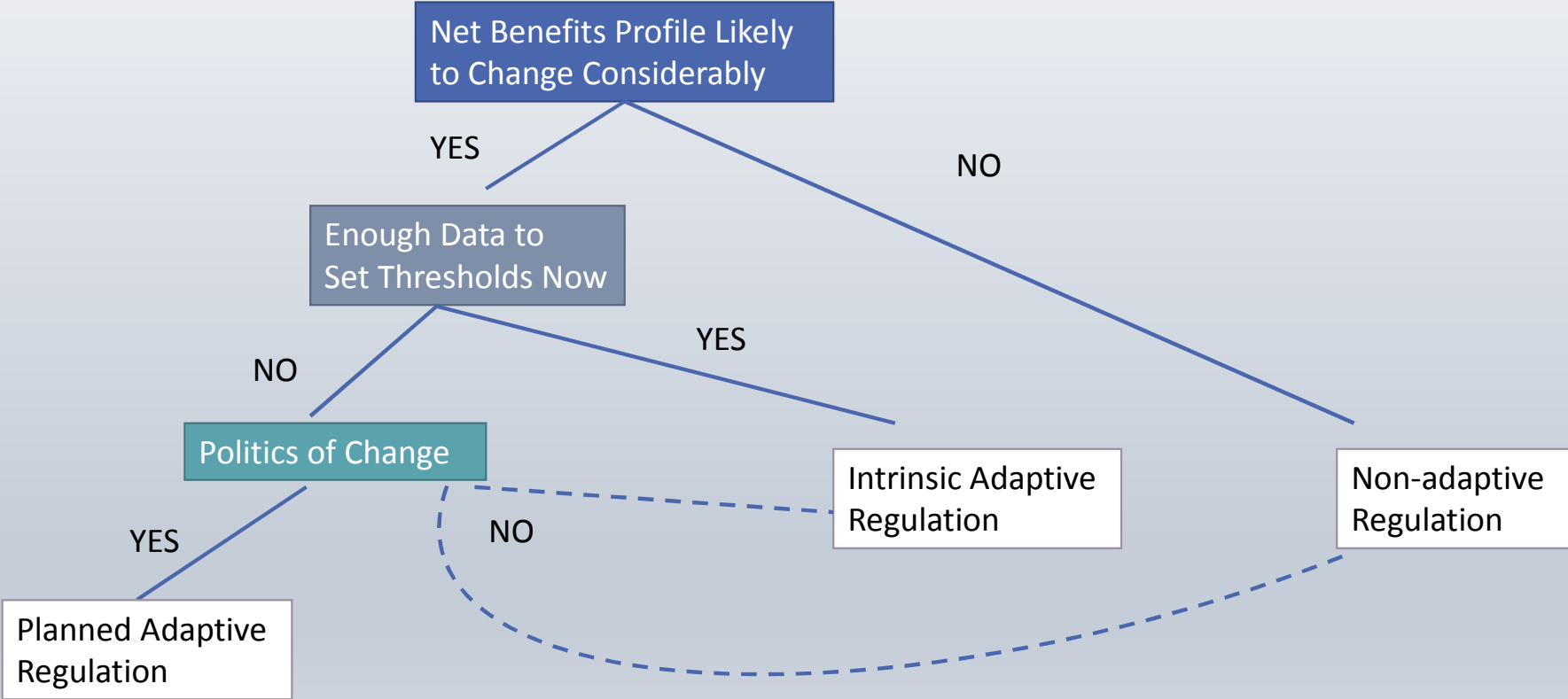
## Intrinsic

- RGGI Carbon Permit Reserve



Allowance supply with allowance reserve
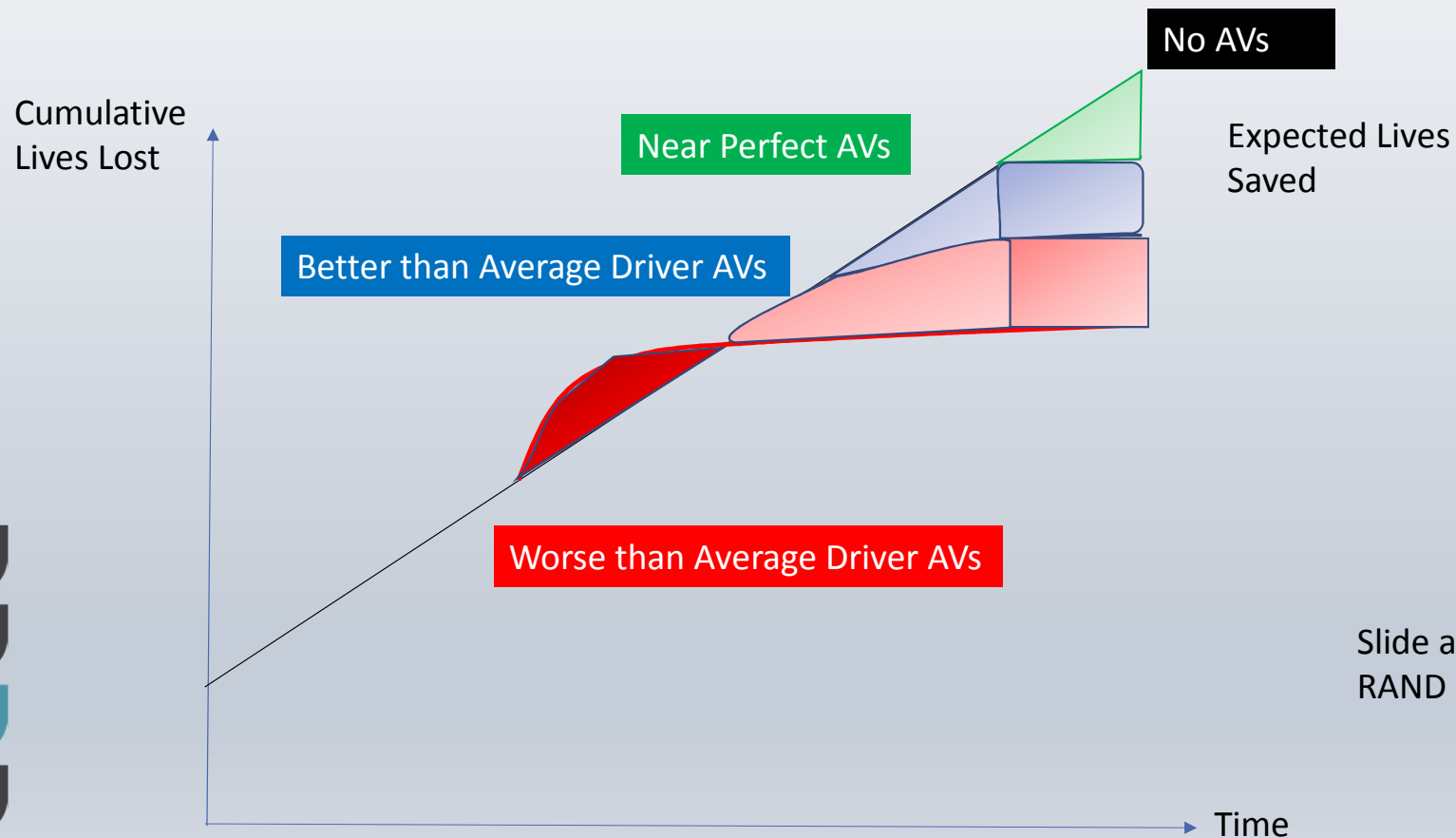
Image Source: Murray, Newell, Pizer 2009

# Comparison of Active and Passive Adaptive Regulation



Speed of Adaptation

Intrinsic Adaptive Regulation

Hybrid Adaptive Regulation

Planned Adaptive Regulation

Breadth of Adaptation

# Decision Framework for Adaptive Regulation



Net Benefits Profile Likely to Change Considerably

YES

NO

Enough Data to Set Thresholds Now

YES

NO

Politics of Change

YES

NO

Intrinsic Adaptive Regulation

Non-adaptive Regulation

Planned Adaptive Regulation

# Example—adaptive licensing



Cumulative Lives Lost

No AVs

Near Perfect AVs

Expected Lives Saved

Better than Average Driver AVs

Worse than Average Driver AVs

Slide adapted from Nidhi Kalra, RAND Corporation, January 2016

Time

# Project team 2017-2018—adaptive regulation of transformative transportation technologies

- Integrated team of undergraduates, graduate students, faculty.

- Evaluate alternative regulations for autonomous vehicles

- Examine how 10 national testing sites are being deployed and how they could be deployed for learning.