



Prohibition of Hydrofluorocarbons (HFCs) in Certain End-Uses



Maryland Department of the Environment (MDE)
Stakeholder Meeting
September 23, 2019



Maryland's HFC Initiative - A High Priority

- On September 11, 2018 Maryland joined with other U.S. Climate Alliance states in committing to phase out the use of HFCs.
- Maryland's September 11, 2018 Press Release
 - "This is an important and necessary step in our ongoing efforts to reach Maryland's greenhouse gas reduction goals," said Governor Larry Hogan. "Our administration is committed to climate leadership by preventing pollution and partnering with other states, businesses, and advocates to make critical progress toward protecting and preserving our environment."
 - "These fast-acting super-pollutants are a major threat to our climate progress and deserve to be phased out at the state and federal level," said Maryland Department of the Environment Secretary Ben Grumbles.

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Purpose of Today's Meeting

- The purpose of today's meeting is to provide an overview of Maryland's draft regulation prohibiting certain uses of HFCs, and to get feedback on how to make sure the regulation will work in the real world
 - Hope to get comment during the meeting today
 - We will also be taking written comment through October 14th
- The next step in our process will be to take a proposed regulation to our Advisory Council on December 16, 2019
 - This step starts our more formal rulemaking process
 - There are continued opportunities for public comment throughout this rulemaking process

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Overview

- Background
 - Greenhouse Gas Reduction Act
 - United States Climate Alliance (USCA)
 - Why regulate hydrofluorocarbons (HFCs)?
 - Federal Program
 - Legal Challenges
- Draft Regulation
- Discussion/Comments
- Next Steps



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The Greenhouse Gas Reduction Acts of 2009 & 2016

- Originated in 2007 by Executive Order which resulted in a 2008 “Climate Action Plan”
- This led to the “Greenhouse Gas Emission Reduction Act” of 2009
 - 25 % Greenhouse Gas (GHG) Emission reduction by 2020
- 2009 law reauthorized in 2016 ... new goals added
 - 40 % GHG reduction by 2030
- The acts also require that the State’s GHG reduction plans support a healthy economy and create new jobs

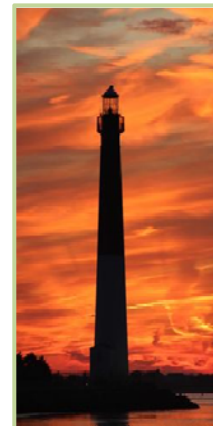


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The Maryland Commission on Climate Change (MCCC)

- MCCC codified into law in 2015
- Establishes a balanced, bipartisan Commission
 - Representatives from state and local government, the private sector, environmental advocacy groups, labor, the general public and more
- Basic charge of the Commission:
 - Provide recommendations on how to reduce GHG emissions and adapt to the impacts of climate change
- Full Commission and four working groups (Mitigation, Adaptation, Science and Communications) meet routinely
 - All meetings open to public
- MCCC has pushed for action on highly potent GHGs like HFCs and methane



<https://mde.maryland.gov/programs/Air/ClimateChange/MCCC/Pages/index.aspx>

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US Climate Alliance

- Maryland joined the U.S. Climate Alliance (USCA) on January 10, 2018
 - Originally, an alliance of 12 states ... now 25 states
- Basic mission: to meet the goals of the Paris Climate Agreement, aiming to reduce GHG emissions by at least 26-28 percent below 2005 levels by 2025
- Maryland is working with other states on short-lived climate pollutant reductions, such as HFCs and methane



www.usclimatealliance.org/

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Why Regulate HFCs?

- HFCs are a part of a group of potent greenhouse gases (GHGs) known as short-lived climate pollutants (SLCP)
- High Global Warming Potential (GWP)
- Clear need to minimize HFC emissions now ... to meet goals of leadership states and the international community to limit global warming
- HFCs emissions could offset many of the benefits of large-scale CO₂ reduction programs

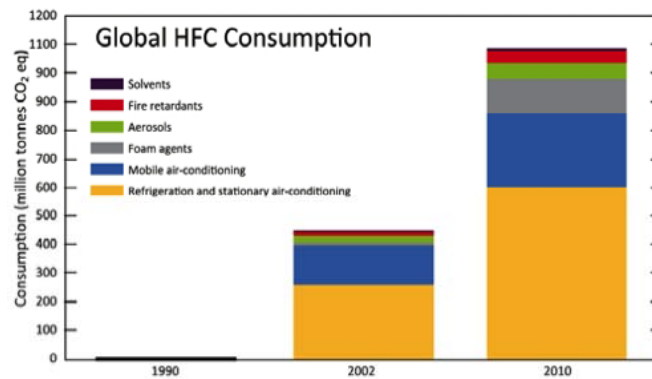


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Why Regulate HFCs? (contd.)

- HFCs are the fastest growing source of GHGs
 - Globally, HFC emissions are increasing 10-15% annually



Source: <https://eia-global.org/campaigns/Climate/what-are-hydrofluorocarbons>

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Global Emissions Reduction Efforts

- 1987 Montreal Protocol
 - Reduce Substances that Deplete the Ozone Layer
 - CFCs were phased out, HFCs replaced them
 - HFCs don't destroy the ozone layer, however they have hundreds-thousands of times the heat-trapping power of CO₂
 - They are also the fastest growing climate pollutants
 - HFCs unchecked growth could add up to 0.5 degrees Celsius to global temperatures by century's end

<https://www.nrdc.org/issues/phase-down-hfcs>

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Global Emissions Reduction Efforts

- 2016 Kigali Amendment
 - 150 countries signed
 - This agreement will cut off the rampant growth of HFCs and replace them with a new generation of alternative chemicals and products that use less energy and produce less pollution.

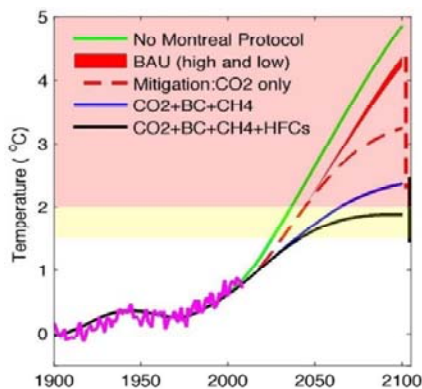
“We estimate that the HFC use avoided through the Kigali Amendment will be equal to more than 70 billion tons of CO₂ over the next 35 years.”

<https://www.nrdc.org/issues/phase-down-hfcs>

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Need for HFC Reduction



- The adjacent figure shows temperature change under various GHG mitigation scenarios analyzed by researchers
- Mitigating CO₂ alone won't prevent the worst climate impacts
- HFC mitigation is required to get closer to the goals of leadership states and the international community

<https://www.atmos-chem-phys.net/13/6083/2013/acp-13-6083-2013.pdf>

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Co-Benefits of HFCs Mitigation

- Low GWP HFC replacements will generate significant co-benefits
 - Energy efficiency benefits
 - Improved energy efficiency drives additional CO₂ reductions
 - Benefits to electricity supply especially during peak demand periods
 - Benefits to Maryland's efforts to continue to make progress on air pollution ... ground-level ozone, sulfur dioxide and fine particulate

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Federal Program: EPA SNAP

- EPA established the Significant New Alternative Policy (SNAP) to identify and evaluate substitutes for ozone-depleting substances
- EPA's 2015 SNAP Rule 20 & 2016 SNAP Rule 21 prohibited high-GWP HFCs by end-use
- The EPA rules were challenged



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Mexichem Fluor vs. EPA

- In August 2017, the DC Circuit Court of Appeals vacated parts of the 2015 SNAP Rule (SNAP Rule 20) "to the extent it requires manufacturers to replace HFCs with a substitute substance"
 - DC Court of Appeals also vacated parts of the 2016 Rule (SNAP Rule 21)
- Rule remanded to EPA- a new EPA rulemaking has not yet occurred
- In 2018, EPA issued guidance stating that it will not be enforcing SNAP Rule 20 or 21 until it adopts new rules reflecting the Court's decision. This has led to uncertainty of compliance of both the 2015 and 2016 SNAP rules on the federal level.



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States Initiate Action

- In the face of stalled federal regulations and to provide regulatory certainty, Maryland and other USCA states are working to move forward with state programs to prohibit the use of certain HFCs
- State programs will require affected sources to transition to widely available alternatives that are less harmful to the environment
- USCA and state efforts are strongly supported by much of the private sector involved in this issue and the environmental community
- Three states already have legislation or regulation adopting the HFC prohibitions in SNAP rules 20 & 21: CA, WA, and VT.
 - Other states moving forward include: DE, CT, and NY

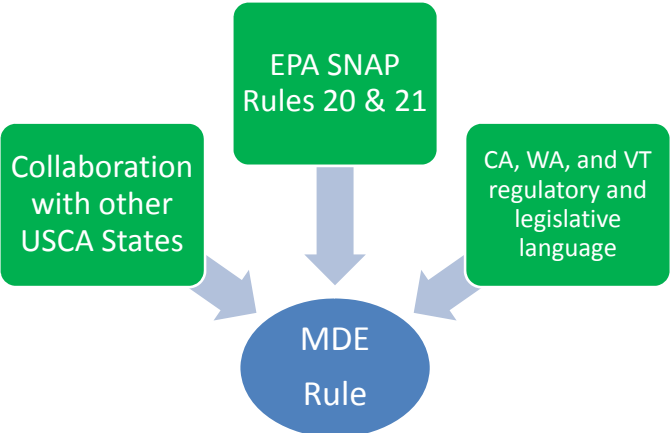
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**DRAFT
REGULATION**



Where Did Maryland's Regulatory Language Come From?




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graph TD
    A[EPA SNAP Rules 20 & 21] --> D((MDE Rule))
    B[Collaboration with other USCA States] --> D
    C[CA, WA, and VT regulatory and legislative language] --> D
    
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Same goal: Require the transition from high-GWP substances to widely available environmentally-friendly alternatives


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Draft Regulations


Major Sectors Affected

- Applies to any person who sells, offers for sale, installs, uses, or introduces into commerce in Maryland, any substance for use in an end-use listed in the regulation




Air Conditioning

- Centrifugal chillers (new)
- Positive displacement chillers (new)




Refrigeration

- Cold storage warehouses (new)
- Household refrigerators and freezers (new)



Foams

- Flexible Polyurethane
- Integral Skin Polyurethane



Aerosol Propellants

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Draft Regulation

Prohibited Substances and Effective Dates

1. Aligns end-use categories, substances, and dates with other USCA States and EPA SNAP Rules 20 and 21, where possible
2. HFC prohibitions only for those end-use categories explicitly stated
3. Maryland is not including mobile AC prohibitions at this time (Light Vehicles MVAC). Maryland will continue to follow this issue and collaborate with other USCA states on it.
4. EPA alternatives: <https://www.epa.gov/snap/snap-substitutes-sector>

Two dates shown in draft proposal: MDE seeking comments on proposed dates

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Draft Regulation

Prohibited Substances and Effective Dates

End-Use	Prohibited Substance	Effective Date
AEROSOL PROPELLANTS		
Aerosol Propellants	HFC-125, HFC-134a, HFC-227ea and blends of HFC-227ea and HFC-134a	January 1, 2021 (or September 1, 2021)

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Draft Regulation

Prohibited Substances and Effective Dates

End-Use	Prohibited Substance	Effective Date
AIR CONDITIONING		
Centrifugal chillers (new)	FOR12A, FOR12B, HFC-134a, HFC-227ea, HFC-236fa, HFC245fa, R-125/ 134a/ 600a (28.1/70/1.9), R-125/ 290/ 134a/ 600a (55.0/1.0/42.5/1.5), R-404A, R-407C, R-410A, R-410B, R-417A, R-421A, R-422B, R-422C, R-422D, R-423A, R-424A, R-434A, R438A, R-507A, RS-44 (2003 composition), THR-03	January 1, 2024
Positive displacement chillers (new)	FOR12A, FOR12B, HFC-134a, HFC-227ea, KDD6, R125/ 134a/ 600a (28.1/70/1.9), R-125/ 290/ 134a/ 600a (55.0/1.0/42.5/1.5), R-404A, R-407C, R-410A, R-410B, R-417A, R-421A, R-422B, R-422C, R-422D, R-424A, R-434A, R-437A, R438A, R-507A, RS-44 (2003 composition), SP34E, THR-03	January 1, 2024

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Draft Regulation

Prohibited Substances and Effective Dates

End-Use	Prohibited Substance	Effective Date
REFRIGERATION		
Cold storage warehouses (new)	HFC-227ea, R-125/290/134a/600a (55.0/1.0/42.5/1.5), R404A, R-407A, R-407B, R-410A, R-410B, R-417A, R-421A, R421B, R-422A, R-422B, R-422C, R-422D, R-423A, R-424A, R428A, R-434A, R-438A, R-507A, RS-44 (2003 composition)	January 1, 2023

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Draft Regulation *Prohibited Substances and Effective Dates*

End-Use	Prohibited Substance	Effective Date
REFRIGERATION		
Household refrigerators and freezers—compact (new)	HFC-227ea, R-125/290/134a/600a (55.0/1.0/42.5/1.5), R404A, R-407A, R-407B, R-410A, R-410B, R-417A, R-421A, R421B, R-422A, R-422B, R-422C, R-422D, R-423A, R-424A, R428A, R-434A, R-438A, R-507A, RS-44 (2003 composition)	January 1, 2021 (or September 1, 2021)
Household refrigerators and freezers (new)	Same as above	January 1, 2022
Household refrigerators and freezers—built in appliances (new)	Same as above	January 1, 2023

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Draft Regulation *Prohibited Substances and Effective Dates*

End-Use	Prohibited Substance	Effective Date
REFRIGERATION		
Supermarket Systems (Retrofit)	R-404A, R-407B, R-421B, R-422A, R-422C, R-422D, R428A, R-434A, R-507A	January 1, 2021 (or September 1, 2021)
Supermarket Systems (New)	HFC-227ea, R-404A, R-407B, R-421B, R-422A, R-422C, R-422D, R-428A, R-434A, R-507A	January 1, 2021 (or September 1, 2021)

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Draft Regulation

Prohibited Substances and Effective Dates

End-Use	Prohibited Substance	Effective Date
REFRIGERATION		
Remote Condensing Units (Retrofit)	R-404A, R-407B, R-421B, R-422A, R-422C, R-422D, R428A, R-434A, R-507A	January 1, 2021 (or September 1, 2021)
Remote Condensing Units (New)	HFC-227ea, R-404A, R-407B, R-421B, R-422A, R-422C, R-422D, R-428A, R-434A, R-507A	January 1, 2021 (or September 1, 2021)

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Draft Regulation

Prohibited Substances and Effective Dates

End-Use	Prohibited Substance	Effective Date
REFRIGERATION		
Stand-Alone Units (Retrofit)	R-404A, R-507A	January 1, 2021 (or September 1, 2021)
Stand-Alone Medium-Temperature Units (New)	FOR12A, FOR12B, HFC-134a, HFC-227ea, KDD6, R125/290/134a/600a (55.0/1.0/42.5/1.5), R-404A, R407A, R-407B, R-407C, R-407F, R-410A, R-410B, R417A, R-421A, R-421B, R-422A, R-422B, R-422C, R422D, R-424A, R-426A, R-428A, R-434A, R-437A, R438A, R-507A, RS-24 (2002 formulation), RS-44 (2003 formulation), SP34E, THR-03	January 1, 2021 (or September 1, 2021)
Stand-Alone Low-Temperature Units (New)	HFC-227ea, KDD6, R-125/290/134a/600a (55.0/1.0/42.5/1.5), R-404A, R-407A, R-407B, R-407C, R-407F, R-410A, R-410B, R-417A, R-421A, R-421B, R422A, R-422B, R-422C, R-422D, R-424A, R-428A, R434A, R-437A, R-438A, R-507A, RS-44 (2003 formulation)	January 1, 2021 (or September 1, 2021)

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Draft Regulation

Prohibited Substances and Effective Dates

End-Use	Prohibited Substance	Effective Date
REFRIGERATION		
Refrigerated food processing and dispensing equipment (New)	HFC-227ea, KDD6, R-125/ 290/ 134a/ 600a (55.0/1.0/42.5/1.5), R-404A, R-407A, R-407B, R-407C, R-407F, R-410A, R-410B, R417A, R-421A, R-421B, R-422A, R-422B, R-422C, R-422D, R424A, R-428A, R-434A, R-437A, R-438A, R-507A, RS-44 (2003 formulation)	January 1, 2021 (or September 1, 2021)

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Draft Regulation

Prohibited Substances and Effective Dates

End-Use	Prohibited Substance	Effective Date
REFRIGERATION		
Vending Machines (Retrofit)	R-404A, R-507A	January 1, 2021 (or September 1, 2021)
Vending Machines (New)	FOR12A, FOR12B, HFC-134a, KDD6, R125/290/134a/600a (55.0/1.0/42.5/1.5), R-404A, R407C, R-410A, R-410B, R-417A, R-421A, R-422B, R422C, R-422D, R-426A, R-437A, R-438A, R-507A, RS-24 (2002 formulation), SP34E	January 1, 2021 (or September 1, 2021)

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Draft Regulation

Prohibited Substances and Effective Dates

End-Use	Prohibited Substance	Effective Date
FOAM		
Flexible Polyurethane	HFC-134a, HFC-245fa, HFC-365mfc, and blends thereof	January 1, 2021 or September 1, 2021
Integral Skin Polyurethane	HFC-134a, HFC-245fa, HFC-365mfc, and blends thereof; Formacel TI, Formacel Z-6	January 1, 2021 or September 1, 2021
Polystyrene Extruded Sheet	HFC-134a, HFC-245fa, HFC-365mfc, and blends thereof; Formacel TI, Formacel Z-6	January 1, 2021 or September 1, 2021
Phenolic Insulation Board and Bunstock	HFC-143a, HFC-134a, HFC-245fa, HFC-365mfc, and blends thereof	January 1, 2021 or September 1, 2021
Polyolefin	HFC-134a, HFC-245fa, HFC-365mfc, and blends thereof; Formacel TI, Formacel Z-6	January 1, 2021 or September 1, 2021
Polystyrene Extruded Boardstock and Billet (XPS)	HFC-134a, HFC-245fa, HFC-365mfc, and blends thereof; Formacel TI, Formacel B, Formacel Z-6	January 1, 2021 or September 1, 2021

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Draft Regulation

Prohibited Substances and Effective Dates

End-Use	Prohibited Substance	Effective Date
FOAM		
Rigid Polyurethane and Polyisocyanurate Laminated Boardstock	HFC-134a, HFC-245fa, HFC-365mfc, and blends thereof	January 1, 2021 or September 1, 2021
Rigid Polyurethane Slabstock and Other	HFC-134a, HFC-245fa, HFC-365mfc and blends thereof; Formacel TI, Formacel Z-6	January 1, 2021 or September 1, 2021
Rigid Polyurethane Appliance Foam	HFC-134a, HFC-245fa, HFC-365mfc and blends thereof; Formacel TI, Formacel Z-6	January 1, 2021 or September 1, 2021
Rigid Polyurethane Commercial Refrigeration and Sandwich Panels	HFC-134a, HFC-245fa, HFC-365mfc, and blends thereof; Formacel TI, Formacel Z-6	January 1, 2021 or September 1, 2021
Rigid Polyurethane Marine Flotation Foam	HFC-134a, HFC-245fa, HFC-365mfc and blends thereof; Formacel TI, Formacel Z-6	January 1, 2021 or September 1, 2021

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Draft Regulation

Prohibited Substances and Effective Dates

End-Use	Prohibited Substance	Effective Date
FOAM		
Rigid polyurethane (PU) high-pressure two-component spray foam	HFC-134a, HFC-245fa, and blends thereof; blends of HFC365mfc with at least 4 percent HFC-245fa, and commercial blends of HFC-365mfc with 7 to 13 percent HFC-227ea and the remainder HFC-365mfc; Formacel TI	January 1, 2021 (or September 1, 2021)
Rigid PU low-pressure two-component spray foam	Same as above	January 1, 2021 (or September 1, 2021)
Rigid PU one-component foam sealants	Same as above	January 1, 2021 (or September 1, 2021)

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Draft Regulation

Clarifying Language

- In line with the DC Circuit Court's decision in *Mexichem Fluor v. EPA*, Maryland's regulation contains the following language:

“Except where existing equipment is retrofit, any person who sells, offers for sale, installs, uses, or introduces into commerce in the State, any substance for use in an end-use listed in Regulation .03 of this chapter prior to the effective dates of the prohibitions specified in Table 1 of §B of this regulation is not required to cease use of the prohibited substance after the effective dates specified in Table 1 of §B of this regulation.”

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Draft Regulation

Disclosure Statement and Recordkeeping

- Disclosure statement: end-user/buyer guidance
 - Provide assurance to owners and manufacturers that compliant substances are being used in products and equipment
 - Based off of language for Refrigeration and AC in CA regulations
 - Maryland expects a disclosure provision to be common amongst USCA states over the few years. We are seeking stakeholder input on this provision
- Recordkeeping information required on-site for 5 years

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Summary

- GGRA, USCA, MCCC, and Governor Initiative are drivers to MDE action
 - HFCs are a growing short-lived climate pollutant and action is needed now
- Federal rule stalled
- MDE seeking comments on the entire draft regulation, and is seeking specific comments on:
 1. Effective dates on prohibitions
 2. Disclosure provisions

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Schedule

- Stakeholder Meeting: Today
- Comments Due: October 14, 2019
- Air Quality Control Advisory Council: December 16, 2019
- Proposed Regulation in the Maryland Register: May 2020
- Public Hearing and final comment period: June 2020
- Rule Adoption and Effective: Fall 2020



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**QUESTIONS ...
DISCUSSION**