The Honorable Thomas J. Vilsack U.S. Department of Agriculture 1400 Independence Ave SW Washington, DC 20250

January 11, 2024

Dear Secretary Vilsack,

We write with concern that the Department of Agriculture is disregarding the science on the climate cost of meat and dairy in high-consuming countries like the United States, and advancing the industries that are driving agricultural emissions.

At COP 28, you were quoted as saying you don't hear much about reducing meat consumption as a climate strategy. But the need to address consumption of high-emissions foods was featured at the conference and the United States bears a responsibility to incorporate this into its climate strategy.¹

In addition to numerous panels discussing this topic at COP 28, the United States joined more than 150 nations in signing the Emirates Declaration on Sustainable Agriculture, Resilient Food Systems and Climate Action,² which includes a pledge to "work collaboratively and expeditiously" to:

"Maximize the climate and environmental benefits – while containing and reducing harmful impacts – associated with agriculture and food systems by conserving, protecting and restoring land and natural ecosystems, enhancing soil health, and biodiversity, and shifting from higher greenhouse gas-emitting practices to more sustainable production and consumption approaches..."

Furthermore, during the first-ever Food, Agriculture and Water Day at COP, which you personally attended, the U.N. Food and Agriculture Organization launched a highly publicized roadmap³ to align food systems with the Paris Agreement that states:

"High consumption of food products with high GHG footprints in some locations contribute unnecessarily to the emissions of agrifood systems...The issue is to know not 'if' diets should change – for they absolutely must for human and planetary health – but how to obtain these results."

The FAO roadmap specifically identifies the inclusion of environmental considerations in national dietary guidelines as well as the importance of improving school food and public procurement programs as effective government actions.

Meat and dairy have significantly higher GHG footprints than other foods across all production systems.⁴, According to the Environmental Protection Agency, animal agriculture via enteric fermentation and manure pollution is the largest domestic source of methane, a greenhouse gas up to 86 times more potent than carbon in the short term.⁶ The United States recognized the importance of rapidly reducing methane emissions when it co-launched the Global Methane Pledge in 2021.⁷

The leading authorities on climate science have highlighted reducing meat consumption as a climate strategy for years. The Intergovernmental Panel on Climate Change not only identified dietary shifts, including meat reduction, as a vital climate mitigation strategy needed to meet the urgent emissions-reduction targets but emphasized the urgency to act.⁸ Research has shown that even if the energy sector

immediately became climate-neutral, we still would not be able to achieve the reductions necessary to avoid catastrophic climate change without reducing meat and dairy consumption.⁹

Additionally, the Kunming-Montreal Global Biodiversity Framework for the Conference on Biodiversity reaffirms the need to reduce animal protein under Target 16.¹⁰ Reducing animal protein is specifically named in the International Union for Conservation of Nature's Global Species Action Plan to achieve the Kunming-Montreal goals.¹¹ Studies show that climate and biodiversity action must be aligned and failing to do so impedes our ability to address either crisis and further threatens food security.^{12, 13}

Food and agriculture make up one-third of global greenhouse gases, ¹⁴ mostly from meat and dairy, even though these resource-intensive foods only make up 18% of calories ^{15, 16} These high-emissions foods are also the leading driver of deforestation and biodiversity loss ¹⁷ and a key source of water pollution and accelerated spread of disease, ¹⁸ posing a severe risk to public health, particularly in marginalized communities, and making it even harder for farmers to adapt to climate change.

The science shows sustainable dietary shifts are key in high-consuming nations like the United States. ^{19,20,21} Changes to production alone are not enough. ^{22,23,24} According to the FAO, the United States is one of only a small handful of countries where consumption exceeds 220 pounds of meat per person per year. ²⁵ Cutting 90% of U.S. beef consumption and replacing half our consumption of other meats with plant-based foods would save more than 2 billion tons of greenhouse gases from being released by 2030²⁶ — equivalent to taking nearly half the world's cars off the roads for a year. ^{27,28}

The United States must take a leading role in reducing food system emissions with strategies that address both production *and* consumption of animal-based foods.

The USDA has repeatedly been urged by scientists (including its own scientific advisory committees), environmental experts, and public health advocates over the past decade to address excessive meat and dairy consumption in food and nutrition policy. But the United States has fallen far behind other G20 nations in even taking the first step of incorporating sustainability into the national dietary guidelines. Under your leadership, the USDA has instead relied on false solutions such as feed additives, which have minimal impact in reducing emissions and aren't scalable, and biogas, which worsens the problem of pollution and greenhouse gas emissions. Improving agricultural production is only one piece of the puzzle, and ignoring dietary shifts in consumption creates an ineffective and weak climate response. The scalable is a scalable in the puzzle, and ignoring dietary shifts in consumption creates an ineffective and weak climate response.

We call on the USDA to take the following actions:

- 1. Immediately make meat and dairy reduction a key part of USDA's climate strategy by acknowledging the role of consumption in climate mitigation and identifying opportunities to support and incentivize dietary shifts.
- 2. Align food and climate goals in all USDA programs and policies, including by increasing access to healthy, plant-based foods in the school meal program.
- 3. Integrate sustainability into the Dietary Guidelines for Americans with an emphasis on plant-forward dietary patterns.

COP28 demonstrated that mitigating food system emissions is a critical part of meeting the goals set by the Paris Agreement. The USDA has the opportunity and responsibility to guide U.S consumers, institutions, food producers and providers toward reducing meat consumption to more sustainable levels.

The role of sustainable U.S. agriculture is crucial in the race to meet global climate targets and national preparedness.³⁹ The USDA must address meat and dairy consumption as part of its climate strategy.

Signed,

Center for Biological Diversity

350 Bay Area Action

350 Seattle

Academy of Nutrition and Dietetics, Vegetarian Nutrition Dietetics Practice Group

Acterra: Action for a Healthy Planet

Agriculture Fairness Alliance

Animal Alliance Network

Animals and Media

Animal Place

Animals United Movement

Anthropocene Alliance

Attorneys for Animals

A Well-Fed World

Balanced

Better Food Foundation

Beyond Extreme Energy

Black VegFest

Black Veg Society

Bosch Nutrition LLC

Brighter Green

Bronson Lakeview Hospital

Buddhist Tzu Chi Foundation

Carbon Advocacy Project

Chef Ann Foundation

Chilis on Wheels

Climate Reality Project Finger Lakes Greater Region NY Chapter

Climate Reality Project Regenerative Agriculture Coalition

Climate Reality Project Western New York Chapter

Climate ReFarm

Coalition for Healthy School Food

Community and Family Aid Foundation - Ghana

Community Food Advocates

Compassion in World Farming

Conservation Connection Foundation

CreatureKind

Cultivate Empathy for All

DC Voters for Animals

DC Environmental Network

Elders Climate Action

Endangered Species Coalition

Environmental Protection Information Center

Fair Start Movement

Farm Forward

Farm Sanctuary

Feedback Global

Food Revolution Network

Food Systems Innovations

Footloose Montana

Friends of the Earth

Greenbaum Foundation

Green Bites

Greener by Default

Greener Earth Foundation

GreenFaith

Greenpeace USA

Growing Hope

Harmon LLC

Health Care Without Harm

Health Promotion Consultants

Healthy Food America

Healthy Kids, Happy Planet

Hill Nutrition Consulting LLC

Horses for Life Foundation

Humane Society of the U.S.

Interfaith Public Health Network

Just Serve LLC

Kettle Range Conservation Group

Kids in Nutrition

Klamath Forest Alliance

Laurie M. Tisch Center for Food, Education & Policy

Life Focus Nutrition Centers

Live Smarter Nutrition & Wellness

Maine Wolf Coalition

Mercy for Animals

Michiganders for a Just Farming System

Mighty Market

National Wolfwatcher Coalition

Native Songbird Care & Conservation

Never Ending Food

New Britain ROOTS, Inc.

New Roots Institute

Northeast Oregon Ecosystems

Northern California Farm Animal Sanctuaries Alliance

Nutrition-In-Sight

NYCLASS

Oceanic Global

Oxfam America

Pacific Nutrition Partners

Physicians Against Red Meat

Physicians Committee for Responsible Medicine

Pivot Nutrition

Planetary Health Collective

Plant Based Canada

Plant Based Treaty

Plant Bully, LLC

Planted Society

Plantrician Provider

Plant Powered Metro New York

Project Coyote

Project Eleven Hundred

ProVeg US

Public Interest Coalition

Purely Planted

PURIS

Rachel Carson Council

Red Jen Ford Health and Wellness

Reducetarian Foundation

ReThink Your Food

Sage Steppe Wild

Science and Environmental Health Network

SEED Strategies for Ethical and Environmental Development

Sequoia Forest Keeper

Sinergia Animal

Society of Behavioral Medicine

Solid Ground Nutritional Counseling LLC

Southern New Hampshire Medical Center

Speak for Wolves

Stand.Earth

Striving to Serve

Sunrise Connecticut

TAPP Coalition

The Humane League

The Raven Corps

The Rewilding Institute

Top Box Foods

Veg Michigan

Waterkeeper Alliance

Waterloo Region Climate Initiatives

Western Watersheds Project

Wilderness Watch

WildEarth Guardians

WildLands Defense

Wolves of the Rockies

World Animal Protection

Youth Climate Save

Youth On Board Organization

Zero Hour

Scientists and other experts:

Steven Allen, environmentalist

Ryan D. Andrews, MS, MA, RDN, LDN, CSCS, nutrition, professor

Carlie Arbaugh, MD, physician, chef

Sarah Armbruster, food system network coordinator

Elizabeth Ayer, farmer, food grower

Michelle Ballard, DNP, healthcare

Irene Bayer, Ph.D, health and nutrition

James Black, MD, Ph.D, MPH, physician

Thomas Bush, MD, physician

Julius Buzzard, farmer, school food and food justice advocate, director of Growing Hope

Alexis Bylander, MSPPM, school food advocate

Elizabeth Carlota Gutierrez, MS, BS, nutrition

Nicholas Carter, MA, climate scientist, co-founder of Plant-Based Data

Gil Carvalho, MD, Ph.D, nutrition, physician

Sarah Chatterley, MPA, food policy advocate

Rose Chilcoat, environmentalist

Yulia Chuvileva, Ph.D, MA, MSc, health and nutrition

Dana Cordy, MPH, RDN, LN, registered dietitian

Tessa Cushman, RDN, registered dietitian

Brenda Davis, RD, registered dietitian

Paul F Dellaripa MD, physician

Adrienne Dorf, MPH, RD, registered dietitian

Jan Dutkiewicz, Ph.D, political economist, professor

Michelle Eckhart RD, LD, registered dietitian

Isaac Emery, Ph.D, environmental scientist

Barbara Erny, MD, physician

Rachel Faber, MD, physician

Hope Ferdowsian, MD, MPH, FACP, FACPM, author, physician

Lisa Fleige, MS, RD, registered dietitian

Lora E. Fleming, MD, Ph.D, MPH, MSc, physician

Reyna Franco, RDN, registered dietitian

Carrie Freeman, Ph.D, researcher, podcaster, professor

Laquita Garbarino, food grower, farmer

Liz Gensler, MPA, food policy specialist

Steven Giardini, food service provider

Phillipp Gioia, MD, MPH, physician

Nilang Gor, MS, biologist, food advocate

Jessica Gorhan, MPH, food justice, nutrition

Jodi Gruhn, MBA, NBHWC, school food advocate, nutrition

Nanci Guest, Ph.D, RD, CSCS, researcher, farmer, registered dietitian

Mohan Gurunathan, environmentalist

Matthew Hayek, Ph.D, climate scientist, professor

David Ho, Ph.D, climate scientist

Lesli Hoey, Ph.D, food policy, professor

Jeffrey Howard, MBA, MSc candidate, nutrition

Jennifer Jacquet, Ph.D, environmental scientist, professor

Tamiko Robin Katsumoto, MD, professor, physician

Parul Kharod, MS, RD, LDN, registered dietitian

Sue Klapholz, MD, Ph.D, physician, VP of health and nutrition at Impossible Foods

Maryann Krasny, Ph.D, professor, director of civic ecology lab

Christine Kestner, LN, health and nutrition

Keegan Kuhn, filmmaker, co-director of What the Health

Megan Weil Latshaw, Ph.D, MHS, environmental scientist, professor

Andrea Learned, climate action catalyst, founder of Learned On

Mike Martin, MD, physician

Michelle McMacken, MD, physician, professor, health director

Lori McPhee, school food advocate

George Monbiot, environmentalist, journalist

Nancy Muse, environmentalist

Marissa Natzke, MPH, RD, registered dietitian

Becky O'Brien, environmentalist, director of food and climate at Adamah

Karen Oppliger, MPH, health and nutrition

Sheila Palevsky, MD, MPH, physician

Elissa Penczar, school nutrition specialist

Catherine Pellegrini, food service provider

Matthew Prescott, author of Food is the Solution: What to Eat to Save the World

Aakash Ranison, environmentalist

William Ripple, Ph.D, ecologist, distinguished professor

Spencer Roberts, environmentalist

Gabriel Rosenberg, Ph.D, professor

Sparsha Saha, Ph.D, professor, political scientist

Neha Sanghera, food policy specialist

Katherine Schwarz, MS, MPH, physician, distinguished professor of health and policy

Jeff Sebo, Ph.D, professor, author

Silvia Secchi, Ph.D, professor, economist, agricultural specialist

Jay Shah, MD, physician, professor, cancer surgeon, chief of staff for Stanford Health Care

Julie Sinistore Ph.D, sustainability consultant

Randal Sloop MD, physician

Justin Sonnenburg, Ph.D, professor

Keith Soster, food service provider

Robert S. Svatek, MD, MSCI, physician, cancer surgeon

Madelyn Valentine RDN, CD, registered dietitian

Tamsin van der Woude, MPH, epidemiologist

Iazsmin Bauer Ventura, MD, physician

Kristen Weiss, Ph.D, ecologist

Mary C. White, MPH, ScD, professor, author

Lynne Williams, sustainable agriculture advocate

H. Leabah Winter, MPH, public health administrator

Natalie A. Wright, food policy specialist

Nezahualcoyotl Xiuhtecutli, Ph.D, anthropologist, advocate for farmworkers and sustainable agriculture Noriko Yamaguchi, PT, DPT, physician, professor

¹ *Politico*. "Tom Vilsack at COP28." (Dec. 11, 2023). https://www.politico.com/newsletters/weekly-agriculture/2023/12/11/tom-vilsack-at-cop28-00131018.

² COP 28 (2023). Emirates Declaration on Sustainable Agriculture, Resilient Food Systems and Climate Action. https://www.cop28.com/en/food-and-agriculture.

³ United Nations Food and Agriculture Organization. Achieving SDG2 Without Breaching the 1.5c Threshold: A Roadmap. (2023). https://www.fao.org/interactive/sdg2-roadmap/en/.

⁴ Poore J, Nemecek T. Reducing food's environmental impacts through producers and consumers. Science. 2018 Jun 1;360(6392):987-992. doi: 10.1126/science.aaq0216. Erratum in: Science. 2019 Feb 22;363(6429): PMID: 29853680. https://pubmed.ncbi.nlm.nih.gov/29853680/.

⁵ Xu, X., Sharma, P., Shu, S., Lin, T. S., Ciais, P., Tubiello, F. N., ... & Jain, A. K. 2021. Global greenhouse gas emissions from animal-based foods are twice those of plant-based foods. Nature Food, 2(9), 724-732. https://doi.org/10.1038/s43016-021-00358-x.

⁶ Environmental Protection Agency. Overview of Greenhouse Gases. https://www.epa.gov/ghgemissions/overview-greenhouse-gases#methane.

⁷ Global Methane Pledge. https://www.globalmethanepledge.org/#about.

⁸ Intergovernmental Panel on Climate Change. (2018). *Special report. Global warming of 1.5 °C.* Source: https://www.ipcc.ch/sr15/.

⁹ Springmann, M., Clark, M., Mason-D'Croz, D., Wiebe, K., Bodirsky, B. L., Lassaletta, L., de Vries, W., Vermeulen, S. J., Herrero, M., Carlson, K. M., Jonell, M., Troell, M., DeClerck, F., Gordon, L. J., Zurayk, R., Scarborough, P., Rayner, M., Loken, B., Fanzo, J., ... Willett, W. (2018). Options for keeping the food system within environmental limits. *Nature*, *562*(7728), 519–525. https://pubmed.ncbi.nlm.nih.gov/30305731/.

- ¹⁰ United Nations Environment Program. Convention on Biological Diversity (2022). Kunming-Montreal Global Biodiversity Framework. https://www.cbd.int/doc/decisions/cop-15/cop-15-dec-04-en.pdf.
- ¹¹ International Union for Conservation of Nature and Natural Resources (2023). Global Species Action Plan Supporting implementation of the Kunming-Montreal Global Biodiversity Framework. https://portals.iucn.org/library/sites/library/files/documents/2023-029-En.pdf.
- ¹² H.-O. Pörtner *et al.* Overcoming the coupled climate and biodiversity crises and their societal impacts. *Science* 380, eabl4881(2023). https://www.science.org/doi/abs/10.1126/science.abl4881.
- ¹³ Chatham House (2022). Aligning Food Systems with Climate and Biodiversity Targets. https://www.chathamhouse.org/2022/10/aligning-food-systems-climate-and-biodiversity-targets.
- ¹⁴Crippa, M., Solazzo, E., Guizzardi, D. *et al.* Food systems are responsible for a third of global anthropogenic GHG emissions. *Nat Food* 2, 198–209 (2021). https://www.nature.com/articles/s43016-021-00225-9#citeas.
- ¹⁵ Poore J, Nemecek T. Reducing food's environmental impacts through producers and consumers. Science. 2018 Jun 1;360(6392):987-992. doi: 10.1126/science.aaq0216. Erratum in: Science. 2019 Feb 22;363(6429): PMID: 29853680. https://pubmed.ncbi.nlm.nih.gov/29853680/.
- ¹⁶ Rust NA, Ridding L, Ward C, Clark B, Kehoe L, Dora M, Whittingham MJ, McGowan P, Chaudhary A, Reynolds CJ, Trivedy C, West N. How to transition to reduced-meat diets that benefit people and the planet. Sci Total Environ. 2020 May 20;718:137208. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7184671/.
- ¹⁷ WWF (2018). Living Planet Report: Aiming Higher. https://www.worldwildlife.org/pages/living-planet-report-2018.
- ¹⁸ Carbon Brief. "Intensive Lower Carbon Animal Farming Could Raise Pandemic Risks." (Matthew Hayek). https://www.carbonbrief.org/guest-post-intensive-lower-carbon-animal-farming-could-raise-pandemic-risks/.
- ¹⁹ Harwatt, H., Sabaté, J., Eshel, G., Soret, S., & Ripple, W. (2017). Substituting beans for beef as a contribution toward US climate change targets. *Climatic Change*, *143*, 261–270.
- https://www.researchgate.net/publication/316879904_Substituting_beans_for_beef_as_a_contribution_toward_US_climate_change_targets.
- ²⁰ Wynes, S., & Nicholas, K. A. (2017). The climate mitigation gap: Education and government recommendations miss the most effective individual actions. *Environmental Research Letters*, *12*(7), 074024. https://iopscience.iop.org/article/10.1088/1748-9326/aa7541.
- ²¹ Friel S., Dangour A.D., Garnett T., Lock K., Chalabi Z., Roberts I., Butler A. Public health benefits of strategies to reduce greenhouse-gas emissions: food and agriculture. *Lancet*. 2009. https://pubmed.ncbi.nlm.nih.gov/19942280/.
- ²² Hedenus, F., Wirsenius, S. & Johansson, D.J.A. The importance of reduced meat and dairy consumption for meeting stringent climate change targets. *Climatic Change* 124, 79–91 (2014). https://link.springer.com/article/10.1007/s10584-014-1104-5#citeas.
- ²³ Hedenus, F., Wirsenius, S. & Johansson, D.J.A. The importance of reduced meat and dairy consumption for meeting stringent climate change targets. *Climatic Change* 124, 79–91 (2014). https://link.springer.com/article/10.1007/s10584-014-1104-5#citeas.
- ²⁴ W. Willett et al., Food in the Anthropocene: The EAT-Lancet Commission on healthy diets from sustainable food systems. *Lancet* 393, 447–492 (2019). https://pubmed.ncbi.nlm.nih.gov/30660336/.
- ²⁵ United Nations Food and Agriculture Organization (FAO). Crops and Livestock Products, 1961-2021. https://www.fao.org/faostat/en/#data/QCL.
- ²⁶ Heller, Martin, Gregory Keoleian, and Diego Rose. (2020) "Implications of Future US Diet Scenarios on Greenhouse Gas Emissions." CSS Report, University of Michigan: Ann Arbor 1-24. https://deepblue.lib.umich.edu/handle/2027.42/191672.
- ²⁷ Calculated using the EPA Greenhouse Gas Equivalencies Calculator Dec. 14, 2023 at https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator.
- ²⁸ González N, Marquès M, Nadal M, Domingo JL. Meat consumption: Which are the current global risks? A review of recent (2010-2020) evidences. Food Res Int. 2020 Nov;137:109341. Epub 2020 May 29. Erratum in: Food Res Int. 2020 Nov;137:109620. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7256495/.
- ²⁹Harvard School of Public Health (2015). 2015 Dietary Guidelines will not include a focus on sustainability. https://www.hsph.harvard.edu/nutritionsource/2015/10/08/2015-dietary-guidelines-will-not-include-a-focus-on-sustainability/.
- ³⁰ McGuire S. Scientific Report of the 2015 Dietary Guidelines Advisory Committee. Washington, DC: US Departments of Agriculture and Health and Human Services, 2015. Adv Nutr. 2016 Jan 15;7(1):202-4. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4717899/.
- ³¹ Center for Biological Diversity (2023). U.S. Lags Behind Other G20 Nations at Adding Sustainability Into Dietary Guidelines. https://www.biologicaldiversity.org/programs/population_and_sustainability/pdfs/g20-dietary-guidelines-analysis.pdf.

³² U.S. Department of Agriculture (2015). "2015 Dietary Guidelines: Giving You the Tools You Need to Make Healthy Choices" By Secretary Tom Vilsack. https://www.usda.gov/media/blog/2015/10/06/2015-dietary-guidelines-giving-you-tools-you-need-make-healthy-choices.

³³Phoebe Gittelson, Danielle Diamond, Lynn Henning, Maria Payan, Lynn Utesch, and Nancy Utesch (2022). The False Promises of Biogas: Why Biogas Is an Environmental Justice Issue. *Environmental Justice* 2022 15:6, 352-361. https://www.liebertpub.com/doi/10.1089/env.2021.0025.

- ³⁴ Domingo, Nina., et al. (2021). Air quality–related health damages of food. *Proceedings of the National Academy of Sciences*. Volume 118, Issue 20. https://www.pnas.org/doi/full/10.1073/pnas.2013637118.
- ³⁵ Weaver KH, Harper LA, Brown SM. (2012) Effects on carbon and nitrogen emissions due to swine manure removal for biofuel production. J Environ Qual. 41(5):1371-82. https://pubmed.ncbi.nlm.nih.gov/23099928/.
- ³⁶ Aneja VP et al. (2008) Characterizing ammonia emissions from swine farms in eastern North Carolina: part 2-potential environmentally superior technologies for waste treatment. J Air Waste Manag Assoc. 58(9):1145-57 (finding a 11.9% increase in ammonia emissions from an open secondary lagoon storing digester waste over an open lagoon storing conventional hog waste) https://pubmed.ncbi.nlm.nih.gov/18817107/.
- ³⁷ Springmann, M., Clark, M., Mason-D'Croz, D., Wiebe, K., Bodirsky, B. L., Lassaletta, L., de Vries, W., Vermeulen, S. J., Herrero, M., Carlson, K. M., Jonell, M., Troell, M., DeClerck, F., Gordon, L. J., Zurayk, R., Scarborough, P., Rayner, M., Loken, B., Fanzo, J., ... Willett, W. (2018). Options for keeping the food system within environmental limits. *Nature*, *562*(7728), 519–525. https://pubmed.ncbi.nlm.nih.gov/30305731/.
- ³⁸ Clark M., Tilman D. Comparative analysis of environmental impacts of agricultural production systems, agricultural input efficiency, and food choice. *Environ. Res. Lett.* 2017;12(6) https://iopscience.iop.org/article/10.1088/1748-9326/aa6cd5/meta.
- ³⁹ Wellesley, L., Happer, C., & Froggatt, A. (2015). Chatham House report. "Changing climate, changing diets pathways to lower meat consumption."

https://www.chathamhouse.org/sites/default/files/publications/research/CHHJ3820%20Diet%20and%20climate%20change%2018.11.15_WEB_NEW.pdf.