

March 17, 2015

Dr. Jonathan Burbaum, Program Director  
Advanced Research Projects Agency-Energy (ARPA-E)  
U.S. Department of Energy  
ATTN: EHEC PEIS  
1000 Independence Avenue, SW, Mailstop-950-8043  
Washington, DC 20585

Re: DOE/EIS-0481 Draft Programmatic Environmental Impact Statement on Engineered High Energy Crops

Dear Mr. Burbaum:

The undersigned groups, representing millions of members around the country and in the southeastern United States, appreciate this opportunity to provide comments to the Department of Energy (DOE) on the Draft Programmatic Environmental Impact Statement on Engineered High Energy Crops (Draft PEIS). Our comments are based on our extensive scientific and policy expertise related to energy crops and invasive species.<sup>1</sup> These comments supplement and add to previous comments submitted to DOE in response to the Request for Information (RFI) on engineered high-energy crops (EHECs), which urged DOE to use caution and take measures to ensure that the selected EHECs do not result in the introduction or spread of potentially invasive organisms or have other unintended negative consequences.

We appreciate DOE's recognition in the Draft PEIS that EHECs may indeed present an invasive species risk. However, as explained in more detail below, the Draft PEIS does not recognize the full magnitude of the potential harm associated with the cultivation of invasive plants as energy crops, indicate that the EHEC program will include adequate measures to manage these risks, or provide sufficient options for DOE to consider in designing the program. In particular, we question the conclusion in the Draft PEIS that any impacts from escape of EHECs into the environment would be minor, and we seek additional explanation for this finding; escaped EHECs that prove invasive could cause significant harm and costs to the economy and environment. In addition, the Draft PEIS would benefit from additional options for DOE to consider; clarification regarding when and how site- and species-specific analysis will occur; and whether best management practices will be required in all cases. We therefore request that DOE amend the Draft PEIS to address the issues included in these comments, which would both strengthen the program and ensure that DOE complies with Executive Order 13112, which provides that DOE may not "authorize, fund, or carry out actions that it believes are likely to cause or promote the introduction or spread of invasive species in the United States or elsewhere."<sup>2</sup>

**DOE's conclusion that invasive species impacts would be minor greatly understates the substantial harms that invasive species cause and the potential for the EHEC Program to cause the introduction of new invasive plants.**

The Draft PEIS concludes that the potential invasive species impacts associated with the EHEC program are minor, but the available evidence does not support this conclusion. Under Executive

Order 13112 (1999), the only rationale for a federal agency to incur risk of invasion is if the benefits clearly outweigh the potential harm and all feasible risk minimization measures are taken. The EHEC program as described in the PEIS appears to increase the risk of introduction and spread of invasive species, with substantial potential costs to the environment and economy.

First, as discussed in the foregoing comments, without some clarification it is difficult to understand how site-specific reviews will consistently operate to exclude potentially invasive species from field trials and minimize the risk of escape. Energy crops consistently present a higher risk of invasion than other plants,<sup>3</sup> and if planted without adequate screening procedures and best management practices (BMPs) may be likely to escape from cultivation and become established in the environment.<sup>4</sup> The PEIS does not describe systems sufficient to identify the risks of particular energy crops or to adequately mitigate those risks for all eligible crops.

Moreover, the environmental and economic impacts of escapes that do occur may be serious and costly. As the federal Invasive Species Advisory Council has noted, “[i]f invasion occurs, the costs associated with the damage may negate the economic benefits conveyed by cultivation of the particular species.”<sup>5</sup> Non-native plants are spreading across roughly 700,000 hectares of U.S. wildlife habitat annually, and an estimated \$34 billion are spent each year in the United States to control these plants.<sup>6</sup> One energy crop that is now being planted commercially, *Arundo donax*, is considered among the IUCN’s top 100 worst invasive species globally,<sup>7</sup> and states including California and Texas are spending up to \$25,000 per acre to eradicate it.<sup>8</sup> Competition with or predation from non-native species is a primary risk factor for nearly half of threatened or endangered species under the Endangered Species Act.<sup>9</sup> Just one invasive species, European purple loosestrife (*Lythrum salicaria*), has threatened nearly 50 native plants, and between damage and control it costs the United States \$45 million each year.<sup>10</sup>

DOE’s Draft PEIS does not accurately reflect the significant impact that invasive EHECs could have on the ecosystem and the economy, and we therefore urge DOE to reconsider the potential environmental impacts from invasive species introduction associated with the EHEC program.

**DOE can improve the Draft PEIS by requiring a weed risk assessment for every EHEC proposal and excluding crops identified as high-risk.**

The discussion of impacts to biological resources in the Draft PEIS does not adequately consider the importance of Weed Risk Assessments (WRAs) in identifying crops with invasive attributes. WRAs, including those created by USDA, can identify plants with high risk of causing environmental or economic harm at a reasonable cost, but the PEIS does not require the use of these tools when considering EHECs. The undersigned groups urge DOE to incorporate WRAs at a programmatic level as a primary screening tool for approval of all EHEC trials. A uniform policy requiring WRA use and exclusion of high risk energy crops prior to funding can significantly reduce the risk of major invasive species impacts associated with the EHEC program.

WRAs are a well-established and accurate tool for evaluating the invasive species risk of plants and predicting which plants pose a high risk of harm. A variety of peer-reviewed WRA tools—including one developed by USDA—are now available to quantify the invasion risk presented by

a given species, hybrid, or cultivar.<sup>11</sup> Researchers are using WRA tools to evaluate candidate energy crops,<sup>12</sup> allowing identification of potential energy crops with low risk and those traits that, if altered, could reduce invasion risk. For example, WRA outcomes indicate that *Miscanthus x giganteus*, a sterile hybrid, presents a low risk of invasion, while a seed-bearing cultivar with the same characteristics would be a high risk.<sup>13</sup>

The Draft PEIS's reference to the *possibility* of conducting WRAs during site-specific analysis<sup>14</sup> does not fully account for the invasion risk potentially associated with EHECs or the usefulness of WRAs in assessing those risks. We urge DOE to require WRAs across the board and to condition project approval on an acceptable WRA outcome. To facilitate this process, DOE could require applicants to submit a completed WRA or the information required to complete one.

**While invasive or noxious plant lists are important tools for excluding harmful energy crops, these lists identify few of the many potentially invasive energy crops and are not a substitute for weed risk assessment.**

Existing regulatory lists of invasive species and noxious weeds are not a substitute for WRAs, but neither should they be ignored. The Draft PEIS is unclear in its treatment of the USDA noxious weed list. At one point it states that plants on the list will be excluded,<sup>15</sup> but in the cumulative effects analysis the document states that “[p]lants that the USDA has determined to be a noxious weed, an invasive species, or has the potential to be invasive or noxious . . . would be only be [sic] allowed under the EHEC Programs as potential crops under careful scrutiny.”<sup>16</sup> We are concerned by the suggestion that listed noxious plants could be included in the program, as USDA has already determined that these plants are harmful and rightfully cannot be cultivated. We urge DOE to clearly exclude listed state or federal noxious weeds from eligibility for EHEC funding.

Conversely, the fact that a plant is not on a noxious weed list does not mean that it is not invasive or does not have the potential to be harmful or invasive. USDA has listed only a few known invasive species as noxious weeds, in part because the noxious weed program is not intended to be a comprehensive listing but rather to identify weeds affecting agriculture. As a result, weeds are often listed only after they are widespread, and plants affecting natural areas (but not agriculture) are rarely listed, even if they cause substantial environmental or economic harm. For example, many bioenergy crops that are known invasive species are not listed as noxious weeds.<sup>17</sup> As a result, while DOE should certainly consult noxious weed lists when reviewing EHECs, it should not conclude that a plant is not invasive if it is not listed. This point underscores the importance of a Weed Risk Assessment, discussed above.

**The Draft PEIS does not clearly explain whether crops that are not genetically engineered, and therefore not regulated by USDA, are eligible for the EHEC program.**

DOE should clarify the relationship of the EHEC program with genetically engineered (GE) crop regulations implemented by the United States Department of Agriculture-Animal and Plant Health Inspection Service-Biotechnology Regulatory Services (BRS) under the Plant Protection Act (PPA). The definitions in the PEIS suggest that the EHEC program will consider both GE

crops subject to BRS oversight and those that do not require permits or environmental assessment pursuant to the PPA. The PEIS does not clearly address the interface between the EHEC program and other existing laws or whether and how EHECs that are not subject to BRS oversight will be evaluated and their risks addressed.

The PEIS defines an EHEC as a species containing “genetic material that has been intentionally introduced through biotechnology, interspecific hybridization or other engineering processes (excluding processes that occur in nature without human intervention).”<sup>18</sup> In addition, “genetic engineering” is defined on the basis of “introducing, eliminating or rearranging specific DNA sequences using the methods of modern molecular biology. (Biotechnology).”<sup>19</sup> This definition is similar but not identical to the definition in United States Department of Agriculture (USDA) regulations issued under the PPA, where “genetic engineering” is defined as “genetic modification of organisms by recombinant DNA techniques.”<sup>20</sup>

DOE’s definitions of EHEC and genetic engineering suggest that the EHEC program will include crops produced through processes that require permits from BRS after environmental assessment, as well as crops that do not trigger those additional regulatory and environmental assessment requirements, such as interspecific hybrids. However, the PEIS does not consider how the presence or absence of BRS oversight may alter the risks associated with EHECs. In addition, the PEIS does not explain (i) what differences exist between its definition of “genetic engineering” and that used by USDA; or (ii) the consequences of those differences.

DOE can substantially improve the PEIS by clarifying the scope of the EHEC program and the relationship between the EHEC program and BRS regulatory processes. Though the draft PEIS states that confined field trials for EHECs will require permits from BRS,<sup>21</sup> we urge DOE to clarify whether and how this process will extend to non-GE EHECs, if they are indeed included within the definition of EHECs, and how environmental assessment will occur for plants not regulated under the PPA.

**A clear explanation of how site-specific analysis will proceed and who will conduct the analysis is needed to enable DOE to understand the potential impacts of the EHEC program.**

We urge DOE to clarify the steps involved in site-specific analysis and the authorities under which such analysis will be conducted. The Draft PEIS refers several times to site-specific analysis that will take place later in the EHEC process, but it is not clear whether this analysis refers to the APHIS BRS (and possibly EPA) permitting or approval process, to additional project-specific NEPA analysis conducted by DOE, or to both. Regarding invasive species, the Draft PEIS states that such site-specific analysis could check proposed EHECs against noxious plant lists, conduct a WRA, and evaluate potential for cross-pollination.<sup>22</sup> It further notes that “[i]f impacts from the proposed EHEC could introduce an invasive species, a site- and species-specific environmental review would be conducted to determine the potential impacts.”<sup>23</sup> But, other than discussing the APHIS BRS permit process, DOE does not explain what this analysis (or these analyses) would consist of or which agency will be responsible. DOE can strengthen the PEIS by identifying the agency or agencies that will conduct required additional analysis under specific conditions, what the framework for doing so will be, and whether the site-specific

findings will translate into binding decisions on project approval and BMPs in every case. In particular, DOE should address whether and how the site- or species-specific analysis will vary for non-GE crops. If the process will differ, DOE should separately assess the risks and anticipated impacts for non-GE and GE crops. This information is necessary to support DOE's programmatic conclusion that none of the alternatives will involve major impacts from introduction of invasive species.

**The Draft PEIS would more effectively mitigate invasive species risks by identifying a default list of Best Management Practices and making funding contingent upon their application.**

We appreciate DOE's discussion of the use of Best Management Practices (BMPs) to combat invasive species risk, but we urge DOE to clarify whether funding will be contingent in every case upon the use of appropriate BMPs to prevent EHEC escape. We suggest that DOE require consideration of a common set of BMPs to prevent escape of EHECs in each project application and require the use of all appropriate BMPs as a condition of each funded project.

The Draft PEIS is not clear about whether BMPs are required or voluntary, or about how BMPs will be selected or required for specific projects. In discussing BMPs generally, the PEIS states in § 1.2 that "Funding for the Proposed Action or Alternatives would be contingent on the implementation of best management practices (BMPs), and would be determined based on the environmental impact analysis in this Draft PEIS." However, § 2.4, again speaking generally, states that "BMPs are not required but should be considered during future site- and plant-specific environmental compliance reviews." Likewise, when discussing invasive species BMPs in particular, the draft lists possible BMPs, but it does not state whether consideration or use of listed BMPs will be required.<sup>24</sup>

To minimize the risk that EHECs spread beyond confined field trials and the potential associated environmental and economic impacts, DOE should clearly establish a set of BMPs whose consideration and use, where appropriate, will be required as a condition of federal support. By establishing a default list of BMPs that project applicants and regulators must consult and determine whether to apply in a given project, DOE can ensure adequate consideration and mitigation of site- and species-specific risks. The list of BMPs in the Draft PEIS<sup>25</sup> includes several useful practices, but we also recommend that DOE consult the International Union for Conservation of Nature's (IUCN) best practices for cultivation of bioenergy crops, summarized in a recent monograph,<sup>26</sup> many of which are also included in the U.S. National Invasive Species Management Plan. In addition to prevention and monitoring, these BMPs extend to containment, eradication, and financial assurance in the case of escape. We encourage DOE to incorporate these elements into a baseline list of BMPs, as well as to include conditions to allow termination or further restriction of EHEC projects if a crop escapes despite the use of BMPs.<sup>27</sup>

**A broader range of alternatives is needed to enable DOE to make informed decisions about the structure and scope of the EHEC program.**

Finally, the acreage-based alternatives in the Draft PEIS do not sufficiently demonstrate the range of alternatives available to DOE in designing its EHEC program. The Draft PEIS includes only a single set of alternatives, which would limit the maximum size of EHEC projects. While

project size is an important component affecting invasion risk, it is insufficient to allow DOE to make an informed determination regarding the design of the EHEC program. By considering additional alternatives, DOE can better characterize and decide how it will design the EHEC program, including whether and how to mitigate invasion risks. DOE is obligated to “rigorously explore and objectively evaluate all reasonable alternatives.”<sup>28</sup> Other feasible options exist that would mitigate invasive species risk, including but not limited to a reliance on a WRA as an initial screening tool and whether to mandate consideration and use of certain BMPs. Presenting solely different trial plot sizes as the alternatives under consideration is unduly narrow, and a broader range of alternatives would facilitate more informed understanding of potential environmental impacts.

We look forward to continued engagement with DOE on these issues. If you have any questions regarding these comments, please do not hesitate to contact us.

Sincerely,

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<sup>1</sup> See, e.g. Lewis, K.C. & R. D. Porter. 2014. *Global approaches to addressing biofuel-related invasive species risks and incorporation into U.S. laws and policies*. Ecological Monographs **84**: 171–201; Quinn, L.D., Gordon, D.R., Glaser, A., Lieurance, S., and Flory, F. 2014. *Bioenergy Feedstocks at Low Risk for Invasion in the USA: a “White List” Approach*. BioEnergy Research, DOI: 10.1007/s12155-014-9503-z; Gordon, D. R., K. J. Tancig, D. A. Onderdonk, and C. A. Gantz. 2011. Assessing the invasive potential of biofuel species proposed for Florida and the United States using the Australian Weed Risk Assessment. *Biomass and Bioenergy* 35: 74-79.

<sup>2</sup> Invasive Species. 1999. Executive Order 13112. 64 FR 6183.

<sup>3</sup> Buddenhagen, C.E. et al. 2009. *Assessing Biofuel Crop Invasiveness: A Case Study*. PLoS ONE 4: e5261.

<sup>4</sup> Buddenhagen, C.E. et al. 2009. *Assessing Biofuel Crop Invasiveness: A Case Study*. PLoS ONE 4: e5261.

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- <sup>5</sup> Invasive Species Advisory Council. 2009. *Biofuels: Cultivating Energy, not Invasive Species*.
- <sup>6</sup> Pimentel, D. et al. 2005. *Update on the environmental and economic costs associated with alien-invasive species in the United States*. *Ecological Economics* 52: 273-288.
- <sup>7</sup> Lowe, S., et al. 2000. *100 of the world's worst invasive alien species: a selection from the Global Invasive Species database*. Invasive Species Specialist Group, Species Survival Commission, World Conservation Union (IUCN), Auckland, New Zealand.
- <sup>8</sup> Giessow, J. et al. California Invasive Plant Council. 2011. *Arundo Donax: Distribution and Impact Report*, at 200.
- <sup>9</sup> Pimentel, *supra* note 19.
- <sup>10</sup> *Id.*
- <sup>11</sup> Pheloung, P. C., et al. 1999. *A weed risk assessment model for use as a biosecurity tool evaluating plant introductions*. *Journal of Environmental Management* 57:239-251; Daehler, C. C. et al. 2004. *A Risk-Assessment System for Screening Out Invasive Pest Plants from Hawaii and Other Pacific Islands*. *Conservation Biology* 18:360-368; Daehler, C. C., and J. G. Virtue. 2010. *Likelihood and consequences: reframing the Australian weed risk assessment to reflect a standard model of risk*. *Plant Protection Quarterly* 25:52-55; Davis, A.S. et al. 2010. *Screening bioenergy feedstock crops to mitigate invasion risk*. *Frontiers in Ecology and Environment* 8:533-539; Koop, A. et al. 2012. *Development and validation of a weed screening tool for the United States*. *Biological Invasions* 14:273-294; Gordon, D. R. et al. 2012. *Weed Risk Assessment for Aquatic Plants: Modification of a New Zealand System for the United States*. *PLoS ONE* 7:e40031.
- <sup>12</sup>; Crosti, R. et al. 2008. 06. *The biofuel weedy menace: weed risk assessment as a management tool to halt loss of farmland biodiversity in Italy*. 13th Meeting of the Subsidiary Body on Scientific, Technical and Technological Advice of the Convention on Biological Diversity. Secretariat of the Convention on Biological Diversity, Rome, Italy; ; Crosti, R. et al. 2010. *Use of a weed risk assessment for the Mediterranean region of Central Italy to prevent loss of functionality and biodiversity in agro-ecosystems*. *Biological Invasions* 12:1607-1616; Gassó, N. et. 2010. *Predicting plant invaders in the Mediterranean through a weed risk assessment system*. *Biological Invasions* 12:463-476;; Gordon, D. R. et al. 2011. *Assessing the invasive potential of biofuel species proposed for Florida and the United States using the Australian Weed Risk Assessment*. *Biomass and Bioenergy* 35:74-79; Barney, J. N., and J. M. DiTomaso. 2008. *Nonnative Species and Bioenergy: Are We Cultivating the Next Invader?* *BioScience* 58:64-70; Davis, P. B. et al. 2011. *Refinement of weed risk assessments for biofuels using Camelina sativa as a model species*. *Journal of Applied Ecology* 48.
- <sup>13</sup> Barney and DiTomaso, *supra* note Lewis and Porter, *supra* note 1, at 173.
- <sup>14</sup> Draft PEIS at 4-24, 5-9.
- <sup>15</sup> *Id.* at 4-24.
- <sup>16</sup> Draft PEIS at 5-9.
- <sup>17</sup> Lewis & Porter, *supra* note 1, at 185-86.
- <sup>18</sup> Draft PEIS at 10-2.
- <sup>19</sup> *Id.* at 10-3.
- <sup>20</sup> 7 C.F.R. § 340.1.
- <sup>21</sup> Draft PEIS at § 1.5.1.
- <sup>22</sup> Draft PEIS at 4-24.
- <sup>23</sup> *Id.* at 4-25–4-26.
- <sup>24</sup> *Id.* at 4-25.
- <sup>25</sup> *Id.*
- <sup>26</sup> See Lewis & Porter, *supra* note 1, at 183; IUCN. 2009. *Guidelines on biofuels and invasive species*. Available at [http://www.iucn.org/about/union/secretariat/offices/iucnmed/iucn\\_med\\_programme/species/invasive\\_species/](http://www.iucn.org/about/union/secretariat/offices/iucnmed/iucn_med_programme/species/invasive_species/). IUCN, Gland, Switzerland.
- <sup>27</sup> Lewis & Porter, *supra* note 1, at 182-183.
- <sup>28</sup> 40 C.F.R. § 1502.14(a).