Science and the politics of sustainability: an analysis of four research-council funded bioenergy projects.

Submitted by Thomas William Richardson, to the University of Exeter as a thesis for the degree of Doctor of Philosophy in Politics

March 2010.

This thesis is available for Library use on the understanding that it is copyright material and that no quotation from the thesis may be published without proper acknowledgement.

I certify that all material in this thesis which is not my own work has been identified and that no material has previously been submitted and approved for the award of a degree by this or any other University.

..................................................................................................................................
Abstract

This thesis provides a detailed exploration of the way that four large research-council-funded bioenergy projects have engaged with the politics of bioenergy sustainability. Given the contested nature of sustainable development and the nature of the science in question, this thesis takes a discourse analysis approach to critically examine the functioning of these projects in the context of the wider politics surrounding the issue of bioenergy sustainability. Drawing on in depth interviews and a wide-ranging analysis of the literature, this thesis presents a number of findings. While used in strategically ambiguous ways, under the dominant ecologically modernising discourse governing bioenergy, sustainability is primarily constructed as synonymous with least-cost decarbonisation. Policy support for bioenergy is built around a technologically optimistic storyline, underpinned by a number of assumptions, including a linear view of scientific policy making. This dominant discourse around bioenergy has been challenged in two main ways. The first of these has rejected the over emphasis on carbon balances and economics as the primary metrics against which bioenergy sustainability should be measured. Decarbonising our energy supply has become increasingly dislocated from its underlying (disputed) ethical and moral rationales. As such it has seemingly become an end in its own right. The second challenge is more subtle and involves a rejection of the framing of bioenergy sustainability as a scientific and technical problem.

Although reproducing a more administrative type discourse, the science initiatives explored in this thesis appear to reinforce much of the dominant discourse. As well as reflecting certain practices associated with the governments focus on scientific policy making, a lack of reflexivity to the strategic aims of energy policy within science also reflects a strong positivism and shared reliance on the perceived linearity of scientific policy making. It is argued that if science is to be liberated to fully respond to the challenges of sustainability, scientists need to be more reflexive as to the (political) role of science in modern environmental controversies, questioning both what their impacts might be and whose interests they are serving.
<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction</td>
<td>11</td>
</tr>
<tr>
<td>1.1</td>
<td>Bioenergy</td>
<td>12</td>
</tr>
<tr>
<td>1.1.1</td>
<td>Bioenergy technology</td>
<td>12</td>
</tr>
<tr>
<td>1.1.2</td>
<td>Energy Policy</td>
<td>15</td>
</tr>
<tr>
<td>1.2</td>
<td>The politics of a sustainable bioenergy</td>
<td>17</td>
</tr>
<tr>
<td>1.2.1</td>
<td>Environmental and social implications of bioenergy</td>
<td>17</td>
</tr>
<tr>
<td>1.2.2</td>
<td>Sustainable Development</td>
<td>18</td>
</tr>
<tr>
<td>1.3</td>
<td>Science and sustainability</td>
<td>19</td>
</tr>
<tr>
<td>1.4</td>
<td>The aims of this thesis</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>Conclusion</td>
<td>23</td>
</tr>
<tr>
<td>2</td>
<td>The importance of discourse</td>
<td>23</td>
</tr>
<tr>
<td>2.1</td>
<td>Discourse and environmental politics</td>
<td>25</td>
</tr>
<tr>
<td>2.1.1</td>
<td>So what is discourse?</td>
<td>25</td>
</tr>
<tr>
<td>2.1.2</td>
<td>The structure/agency debate</td>
<td>26</td>
</tr>
<tr>
<td>2.2</td>
<td>The use of Discourse in this thesis</td>
<td>28</td>
</tr>
<tr>
<td>2.2.1</td>
<td>A more important role for human agency</td>
<td>29</td>
</tr>
<tr>
<td>2.2.2</td>
<td>Meta-level concepts: Storylines and discourse coalitions</td>
<td>30</td>
</tr>
<tr>
<td>2.2.3</td>
<td>Storylines and keywords; the case of sustainable development</td>
<td>31</td>
</tr>
</tbody>
</table>
4.1 Energy policy and sustainable development ........................................... 77
  4.1.1 Energy security ................................................................................. 77
  4.1.2 Climate change ................................................................................. 78
4.2 The new sustainable energy paradigm .................................................... 78
  4.2.1 A Regulatory State Paradigm? ......................................................... 80
  4.2.2 Economic Rationalism or Ecological modernisation? ....................... 81
  4.2.3 Sustainable economic growth ........................................................... 82
  4.2.4 A reliance on science and technology ............................................... 83
  2.2.5 Ecological Modernisation in practice ................................................. 84
4.3 The RTFO and Biofuel debate ................................................................. 87
  4.3.1 The beginnings of the debate ........................................................... 87
  4.3.2 Heating up the debate ..................................................................... 90
4.4 Ecological modernisation and biofuels .................................................... 93
4.5 Why was dissent so slow to materialise? ................................................ 96
  4.5.1 A storyline of sustainable development ............................................. 96
  4.5.2 A Focus on heat and electricity ....................................................... 101
Conclusion ............................................................................................... 104
Chapter 5 The politics of sustainability .......................................................... 104
  5.1 A debate over sustainability ................................................................. 105
    5.1.1 Sustainable development and biofuels ............................................ 106
    5.1.2 Ecological modernisation and sustainable development ............... 108
    5.1.3 Sustainable development as contested discourse ....................... 109
  5.2 Sustainability and the hegemony of climate change ............................. 110
  5.3 ‘Realising the potential of bioenergy’ .................................................. 111
  5.4 Science and sustainability ................................................................. 114
    5.4.1 A recourse to science and rationality .............................................. 114
    5.4.2 Science based policy as practice: sustainability standards ............. 116
    5.4.3 The Gallagher review ................................................................. 119
6.4 Green radicals, economic rationalists and sustainable development ....170
   6.4.1 Green radical ..................................................................................171
   6.4.2 Economic rationalist ........................................................................172
   6.4.3 The hegemony of pragmatism and administration .........................173

   Conclusion ...............................................................................................175

Chapter 7 A politicisation of science? .............................................................177
   7.1 The hegemony of relevance .................................................................178
      7.1.1 Structuring science ......................................................................179
      7.1.2 Relevance and competition between the projects .......................181
      7.1.3 Timescales ..................................................................................182
      7.1.4 Structured interests .....................................................................183

   7.2 Relevance and objectivity ....................................................................185
      7.2.1 Sustainability and Ambiguity .......................................................186

   7.3 Relevance and legitimacy ....................................................................191
      7.3.1 Interdisciplinarity and interactivity on the projects .....................193
      7.3.2 Project tensions ..........................................................................194
      7.3.3 The public as consumers of science .........................................197

   7.4 Impacts of a dominant positivist discourse .......................................202
      7.4.1 Social science as ‘end of pipe’ research ....................................202

   7.5 Administrative rationalism and positivism .........................................205

   Conclusion ...............................................................................................209

Chapter 8. Discussion: Science for sustainability ............................................211
   8.1 Reinforcing discourses .......................................................................211
      8.1.1 Polarisation of the debate ............................................................213
      8.1.2 Negotiating Boundaries ...............................................................215

   8.2 Bioenergy for sustainability ...............................................................218

   8.3 Science for sustainability ....................................................................220
      8.3.1 Legitimacy and public participation ...........................................221
Acknowledgements

First of all I would like to thank my supervisors, Professor Michael Winter and Dr David Hodgson. In particular I am grateful to Michael for helping me make the transition from the natural sciences to the social sciences. I am also grateful to Dave for his willingness to engage so positively with a field of academia far removed from his usual interest. I would also like to thank Professor Catherine Mitchell and Dr Bridget Woodman, for dedicating to me so much of their time and input during the later stages of this thesis. This thesis would not have been possible without the generous funding from UKERC, and I am grateful to have had the opportunity to carry out his research. Finally, I would like to thank Dr Jodie West, for all the support she has provided me during the past three and a half years, particularly during those last difficult stages; I could not have done it without you.