

# Contents

|                                                                                                                                      |           |
|--------------------------------------------------------------------------------------------------------------------------------------|-----------|
| Abstract .....                                                                                                                       | 5         |
| Acknowledgements .....                                                                                                               | 6         |
| Figures .....                                                                                                                        | 12        |
| Images.....                                                                                                                          | 14        |
| Maps .....                                                                                                                           | 15        |
| Tables .....                                                                                                                         | 16        |
| Abbreviations.....                                                                                                                   | 16        |
| <br>                                                                                                                                 |           |
| <b>1. Introduction .....</b>                                                                                                         | <b>19</b> |
| 1.1 Concept, background and research questions .....                                                                                 | 19        |
| 1.1.1 Concept and background.....                                                                                                    | 19        |
| 1.1.2 Research questions.....                                                                                                        | 23        |
| 1.2 Energy research in social sciences .....                                                                                         | 26        |
| 1.2.1 Energy in social anthropology.....                                                                                             | 26        |
| 1.2.2 Energy and society – research perspectives .....                                                                               | 28        |
| 1.3 The choice of a research spot – Mumias, Western Kenya .....                                                                      | 30        |
| 1.4 Researching energy – terms, concepts and theories .....                                                                          | 32        |
| 1.4.1 The household as unit of analysis and observation –<br>concept, notion and definition .....                                    | 32        |
| 1.4.2 Conceptualizing residential energy consumption .....                                                                           | 36        |
| 1.4.3 Social stratification.....                                                                                                     | 40        |
| 1.4.4 Concepts and terms used in the Mumias ethnography .....                                                                        | 46        |
| 1.5 Overview – guiding through chapters .....                                                                                        | 47        |
| <br>                                                                                                                                 |           |
| <b>2. The framework: global energy statistics and the<br/>basic energy needs discourse.....</b>                                      | <b>50</b> |
| 2.1 Introduction .....                                                                                                               | 50        |
| 2.2 Energy consumption = energy statistics? A ‘mainstream’ view .....                                                                | 51        |
| 2.2.1 Perceptions and definitions – search engine results .....                                                                      | 51        |
| 2.2.2 Behind statistics, projections and forecasts –<br>international energy organizations.....                                      | 55        |
| 2.2.3 Global topics and challenges as represented in the World Energy<br>Outlook (WEO) and Poor People’s Energy Outlook (PPEO) ..... | 60        |
| 2.3 How much energy? Basic needs and wants – energy poverty and<br>energy decadence .....                                            | 62        |
| 2.3.1 Economic growth and energy consumption.....                                                                                    | 62        |
| 2.3.2 Researching basic energy needs .....                                                                                           | 64        |

2.3.3 Basic energy needs or energy poverty? ..... 84

2.4 Switching the level – from the global to a national perspective..... 86

**3. Switching the perspectives – national, local and residential energy consumption..... 87**

3.1 Introduction ..... 87

3.2 Kenya energy profile – a national view on energy statistics ..... 89

3.3 A question of the unit I: the continent – the supranational union – the state – the region – the city or the ‘household’?

State centred research vs. local points of comparison ..... 102

3.4 A question of the unit II: energy sectors – industry, transport, commercial and residential energy consumption ..... 105

3.5 The Kenyan residential energy sector – characteristics and challenges..... 110

3.5.1 Characteristics ..... 110

3.5.2 Challenges in estimating residential energy consumption ..... 112

3.6 The Kenyan power sector ..... 116

3.7 Conclusion ..... 119

**4. Mumias – energy environment ..... 122**

4.1 Introduction ..... 122

4.2 Mumias – a region shaped by the agro-industrial development of the Mumias Sugar Company (MSC) ..... 123

4.2.1 Mumias and Mumias Sugar Company (MSC) ..... 123

4.2.2 Mumias Sugar Company (MSC) – development..... 125

4.3 Mumias – urban geography ..... 130

4.3.1 Mumias – overview ..... 130

4.3.2 Ekero and St. Mary’s ..... 134

4.3.3 Mumias – town centre, Kamkon, Manyatta and Lumino ..... 134

4.3.4 Ekama and Lukoye..... 136

4.3.5 Shibale..... 138

4.3.6 Mumias Sugar Company (MSC) and the company’s housing estates ..... 139

4.3.7 Mayoni ..... 141

4.4 Household energy consumption in Mumias – administrative structure and regional data..... 142

4.4.1 Mumias town, Mumias Municipality and the Mumias region – administrative development..... 142

4.4.2 Household energy consumption – regional data for Mumias and Kakamega ..... 146

|           |                                                                                                                       |            |
|-----------|-----------------------------------------------------------------------------------------------------------------------|------------|
| 4.5       | The Mumias Sugar Company (MSC) residential estates –<br>a special setting to study household energy consumption ..... | 155        |
| 4.6       | Mumias – a rural town displaying societal diversity.....                                                              | 159        |
| <b>5.</b> | <b>Fuel stacking in complex household settings –<br/>current energy consumption in Mumias .....</b>                   | <b>161</b> |
| 5.1       | Introduction .....                                                                                                    | 161        |
| 5.2       | Researching household energy inventory.....                                                                           | 162        |
| 5.3       | Socio-economic classification of households.....                                                                      | 166        |
| 5.4       | Data collection, challenges and the choice of case studies .....                                                      | 170        |
| 5.5       | Case studies I – household diversity in Mumias and around .....                                                       | 175        |
| 5.5.1     | Simon, Diana and family – a semi-urban upper middle-class household<br>near Bungoma.....                              | 175        |
| 5.5.2     | Two interlinked households: David and Mary’s family and<br>Erica’s single household in Emukokho village.....          | 180        |
| 5.5.3     | Linda – a lower middle-class single household in Nambale .....                                                        | 186        |
| 5.5.4     | Kamkon – Jim and Mary – an urban family in a<br>low-income area of Mumias.....                                        | 190        |
| 5.5.5     | Bhavian and Mahika – a family of the Indian minority in Mumias .....                                                  | 193        |
| 5.6       | Case Studies II – Mumias Sugar Company (MSC) estates .....                                                            | 197        |
| 5.6.1     | Paul and Mercy – A family living in the outskirts of Bungoma town<br>and partly in MSC Managerial Estate .....        | 197        |
| 5.6.2     | Nikita – struggling towards a reliable 24/7 electricity supply through<br>technical innovations .....                 | 203        |
| 5.6.3     | Liz and Patrick – a low-income household in Lower Central Estate.....                                                 | 206        |
| 5.7       | The non-household cases.....                                                                                          | 209        |
| 5.8       | Summary and conclusion .....                                                                                          | 211        |
| 5.8.1     | Household settings and conditions .....                                                                               | 211        |
| 5.8.2     | Standard of living and energy consumption.....                                                                        | 212        |
| 5.8.3     | Energy ladder and fuel stacking model .....                                                                           | 215        |
| 5.8.4     | The household or the individual? .....                                                                                | 215        |
| <b>6.</b> | <b>Energy consumption in the life course –<br/>climbing and descending the energy ladder .....</b>                    | <b>217</b> |
| 6.1       | Introduction .....                                                                                                    | 217        |
| 6.2       | Life course approach and energy consumption – background .....                                                        | 218        |
| 6.3       | A life course perspective on energy consumption in Mumias .....                                                       | 223        |
| 6.4       | Energy CV’s – the household fuel transition in the life course .....                                                  | 225        |
| 6.5       | Methodology .....                                                                                                     | 227        |

|           |                                                                                                                                      |            |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------|------------|
| 6.6       | Case Studies .....                                                                                                                   | 230        |
| 6.6.1     | Charlotte – aspiring access to clean and modern energy.....                                                                          | 230        |
| 6.6.2     | Kevin – struggling to sustain his family with motor bike (boda boda)<br>business and subsistence farming .....                       | 232        |
| 6.6.3     | Linda – energy aspirations of a young self-employed business lady.....                                                               | 235        |
| 6.6.4     | Brandon – a young professional seeking for his first job.....                                                                        | 238        |
| 6.6.5     | Nikita – trying to stabilize energy supply for herself and her son .....                                                             | 241        |
| 6.6.6     | Patrick – seeking for a stable job, while moving up and<br>down the energy ladder.....                                               | 244        |
| 6.6.7     | Erica – between business and care –<br>experiences of descending the energy ladder .....                                             | 247        |
| 6.6.8     | Janet – between grid- and solar-based electricity access energy<br>in Matungu.....                                                   | 249        |
| 6.6.9     | Paul – Managerial Estate, Bungoma and Kituni – commuting within a<br>multiple household setup.....                                   | 254        |
| 6.7       | Discussion and analysis.....                                                                                                         | 257        |
| 6.7.1     | General trends of the household settings and<br>the household fuel transition.....                                                   | 257        |
| 6.7.2     | Anticipated transitions in the life course .....                                                                                     | 258        |
| 6.7.3     | Mundane transitions in the life course.....                                                                                          | 262        |
| 6.7.4     | Different stoves, different practices – standard cooking technologies .....                                                          | 263        |
| 6.7.5     | Individuals and the energy ladder.....                                                                                               | 263        |
| <b>7.</b> | <b>Future energy expectations and aspirations.....</b>                                                                               | <b>266</b> |
| 7.1       | Introduction – the Future Vision Photo Series .....                                                                                  | 266        |
| 7.2       | Methodology .....                                                                                                                    | 267        |
| 7.3       | Case studies .....                                                                                                                   | 269        |
| 7.3.1     | Liz and Patrick – MSC Lower Central Estate .....                                                                                     | 269        |
| 7.3.2     | Lewis – boda boda driver in the outskirts of Mumias.....                                                                             | 271        |
| 7.3.3     | Mary and Jim – Kamkon – Mumias Town.....                                                                                             | 273        |
| 7.3.4     | Jacob.....                                                                                                                           | 275        |
| 7.3.5     | Nikita – MSC Lower Central Estate.....                                                                                               | 277        |
| 7.3.6     | Martin – MSC Managerial Estate .....                                                                                                 | 279        |
| 7.4       | Summary and overall results .....                                                                                                    | 282        |
| <b>8.</b> | <b>Present, past and future – a comprehensive analysis .....</b>                                                                     | <b>288</b> |
| 8.1       | Introduction .....                                                                                                                   | 288        |
| 8.2       | Case studies accompanied with the Household Energy Inventory<br>Interview (HHI), Energy CV (E-CV) or Future Vision Photo Series..... | 289        |

8.2.1 Nikita (HHI, E-CV, Future Vision Photo Series) ..... 289

8.2.2 Liz and Patrick (HHI, E-CV, Future Vision Photo Series) ..... 290

8.2.3 Brandon (HHI and E-CV) ..... 291

8.2.4 Linda (HHI and E-CV)..... 292

8.2.5 Paul (HHI and E-CV) ..... 292

8.2.6 Jim and Mary (HHI and Future Vision Photo Series)..... 293

8.3 Summary..... 294

  

**9. Conclusion..... 295**

9.1 Introduction ..... 295

9.2 Approaching energy consumption ..... 296

9.3 Key findings ..... 297

9.3.1 Perceiving energy and basic energy needs ..... 297

9.3.2 Energy statistics in Kenya – how to account for the use of solid biomass? .. 300

9.3.3 Energy settings and household energy consumption ..... 301

9.3.4 The energy ladder and fuel stacking model reflected in  
ethnographic data from Mumias..... 302

9.3.5 Improved living conditions and energy embodied in goods..... 305

9.4 Limitations and challenges ..... 306

9.4.1 Limitations..... 306

9.4.2 Challenges..... 308

9.5 Practical implications, future work and outlook ..... 309

  

**10. Publication bibliography..... 313**

Publication bibliography ..... 313

  

**11. Annex..... 337**

11.1 Mumias – maps and statistics ..... 337

11.2 Household energy inventory questionnaire ..... 341

11.3 Energy-CV ..... 346

11.3.1 Fill in table for biographical data..... 346

11.3.2 Guiding question for the biographical interview..... 346

11.4 Future Vision Photo Series ..... 348