



2013



CANADIAN CLEAN TECHNOLOGY INDUSTRY REPORT



analytica advisors



analytica advisors

**Analytica Advisors**

111 Russell Avenue

Ottawa, Ontario

K1N 7X2 CANADA

T 613 866 9157

E [info@analytica-advisors.com](mailto:info@analytica-advisors.com)

[www.analytica-advisors.com](http://www.analytica-advisors.com)

Copyright © 2012 Analytical Advisors Inc.

ISBN 978-0-9865839-0-4

This edition of the 2013 Canadian Clean Technology Industry Report – Complete Edition has been compiled and published by Analytica Advisors Inc. (“Analytica”) for the exclusive use and information of those clean technology companies who have participated in Analytica’s research, for elected officials and their direct advisors with responsibility for clean technology, innovation, energy and the environment and for subscribers to the report. No parties have paid to publish any materials in this publication. Each published copy of this work is licensed solely for the use of the recipients and may not be shared. No part of this work may be redistributed, copied, re-published or transmitted in any form or by any means – graphic, electronic, or mechanical, including photocopying, recording, taping, or information retrieval systems without the express written consent of Analytica Advisors Inc. Other persons who wish a copy of this material or to license any of its content should contact Analytica Advisors Inc. at [info@analytica-advisors.com](mailto:info@analytica-advisors.com) for licensing information.

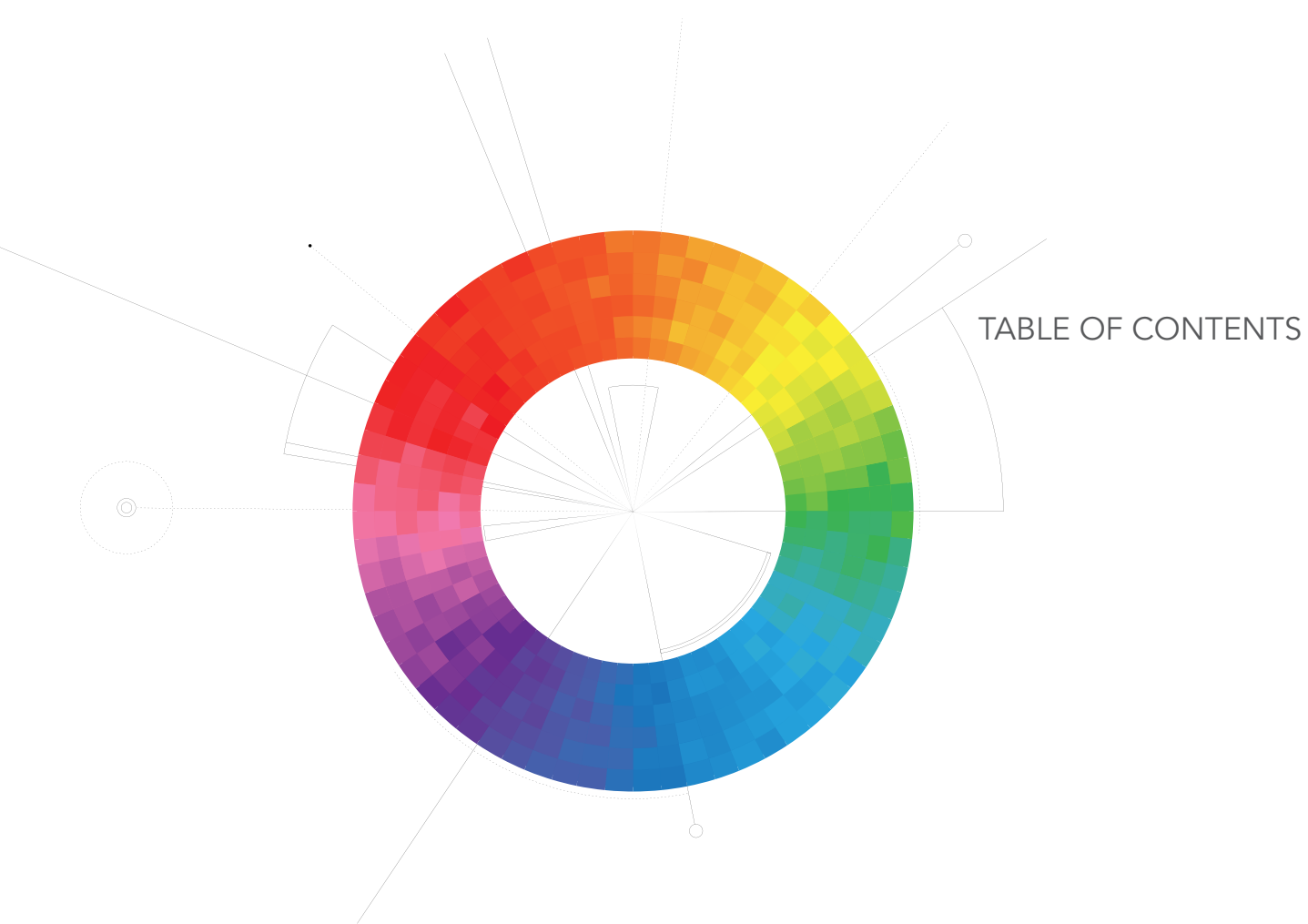


TABLE OF CONTENTS

# Table of Contents

Executive Summary .....	3
<b>Chapter 1 – Context, Methodology and Frameworks</b>	
1.1 Introduction .....	19
1.2 Canadian Clean Technology - Called up to the Big League.....	19
1.2.1 Clean Technology: An Economic Driver Within Canada.....	19
1.3 Global Domestic Context .....	24
1.3.1 Context: Continued Slowdown in the Global Economy and the New Economic Narrative for Energy Technology .....	24
1.3.2 Context: Clean Technology and Trade .....	26
1.3.3 Context: Clean Technology and Innovation .....	31
1.3.4 Context: Clean Technology and Canada’s Energy .....	32
1.4 Rationale for Clean Technology Industry Report .....	34
1.4.1 Why the 2013 Report.....	34
1.4.2 Company Definitions.....	38
1.5 Methodology and Sample .....	41
1.6 Frameworks .....	42
1.6.1 The Clean Technology Classification .....	42
1.6.2 Technology Commercialization Framework .....	44
<b>Chapter 2 – Global Industry Landscape</b>	
2.1 Introduction .....	47
2.2 Industry and Sector Revenues and Growth .....	50
2.2.1 Estimated Industry Revenues .....	50
2.3 Industry Employment.....	57
2.3.1 Clean Technology Industry Employment.....	57
2.3.2 Clean Technology Industry Employment Growth .....	60
2.3.3 Clean Technology Industry Employment in the Context of Canadian Industries .....	61
2.3.4 Clean Technology Industry Employment Progress to 2020 Targets .....	62
2.3.5 Key Human Resource Gaps: Business Development and Sales Professionals both Domestically and Internationally .....	63

2.4 Sustainability, Productivity and the Canadian Economy .....	66
2.5 Regional Landscape.....	69
2.5.1 Regions and Sectors.....	69
2.6 Global Markets .....	72
2.6.1 Estimated Global Markets Have Held Steady at \$1 Trillion for 2011 .....	72
2.6.2 2020 Global Market Projections: Mid and High Growth Scenarios.....	74
2.7 Measuring Canada`s Clean Technology Industry`s Progress to Becoming a Significant Canadian Industry .....	77
2.7.1 Industry Revenue Projections.....	77
2.7.2 Canadian Industry Revenue in Global Market Context.....	80
2.8 Exports and Export Markets of Interest .....	82
2.8.1 Canadian Clean Technology Export Revenues .....	82
2.8.2 The Potential for a Growing and Large Canadian Clean Technology Export Industry. ....	86
2.8.3 2011 Canadian Clean Technology Companies Exporting by Sector .....	86
2.8.4 Canadian Clean Technology Export Countries of Interest.....	88
2.9 Research & Development and Intellectual Property .....	90
2.9.1 Canadian Clean Technology Firms were Founded to Commercialize Private Sector Originating IP .....	90
2.9.2 Clean Technology R&D or Business Expenditure on Research & Development (BERD) .....	90
2.9.3 Clean Technology R&D in the Context of Other Industries.....	92
2.9.4 Clean Technology R&D Compared to Other Canadian Industries .....	93
2.9.5 Clean Technology Investment in Protecting Intellectual Property .....	94
2.10 Capital Investment .....	96
2.10.1 Debt and Equity Components of Capital Requirements for Clean Technology Companies .....	100
2.11 Canadian Clean Technology Industry Overview.....	104
2.11.1 Global Markets and Canadian Market Share .....	108
2.11.2 Canadian Industry Commercialization Profile .....	109
2.11.3 Canadian Industry Exports and Markets.....	110
2.11.4 Canadian Industry R&D, IP Patenting, Commercialization Maturity .....	111

2.11.5 Canadian Industry Employment and Human Resources ..... 112

2.12 Appendix: 2011 and 2020 Global Market Estimates..... 113

    2.12.1 Changes to the Global Market and Canadian Clean Technology Sector Taxonomy ..... 113

    2.12.2 Additional New Subsector Market Sizes ..... 113

    2.12.3 Decreased CAGRs for Five Sectors..... 113

    2.12.4 Market Size Adjustments for Three Sectors ..... 114

    2.12.5 Changes to CAGRs..... 114

**Chapter 3 – Biorefinery Products**

3.1 Biorefinery Products Overview..... 117

3.2 Biorefinery Products Global Markets and Canadian Market Share ..... 119

3.3 Biorefinery Products Commercialization Profile ..... 121

3.4 Biorefinery Products Exports and Markets..... 123

3.5 Biorefinery Products R&D, IP Patenting, Commercialization Maturity ..... 124

3.6 Biorefinery Products Employment and Human Resources..... 125

**Chapter 4 – Power Generation**

4.1 Power Generation Overview ..... 129

4.2 Power Generation Global Markets and Canadian Market Share ..... 131

4.3 Power Generation Commercialization Profile ..... 133

4.4 Power Generation Exports and Markets ..... 135

4.5 Power Generation R&D, IP Patenting, Commercialization Maturity ..... 137

4.6 Power Generation Employment and Human Resources..... 139

**Chapter 5 – Energy Infrastructure/Smart Grid**

5.1 Energy Infrastructure/Smart Grid Overview ..... 143

5.2 Energy Infrastructure/Smart Grid Global Markets and Canadian Market Share..... 145

5.3 Energy Infrastructure/Smart Grid Commercialization Profile ..... 147

5.4 Energy Infrastructure/Smart Grid Exports and Markets ..... 149

5.5 Energy Infrastructure/Smart Grid R&D, IP Patenting, Commercialization Maturity ..... 151

5.6 Energy Infrastructure/Smart Grid Employment and Human Resources..... 153

## **Chapter 6 – Energy Efficiency**

6.1 Energy Efficiency Overview .....	157
6.2 Energy Efficiency Global Markets and Canadian Market Share.....	159
6.3 Energy Efficiency Commercialization Profile.....	161
6.4 Energy Efficiency Exports and Markets.....	163
6.5 Energy Efficiency R&D, IP Patenting, Commercialization Maturity.....	165
6.6 Energy Efficiency Employment and Human Resources .....	167

## **Chapter 7 – Industrial Processes & Products**

7.1 Industrial Processes & Products Overview .....	171
7.2 Industrial Processes & Products Global Markets and Canadian Market Share	173
7.3 Industrial Processes & Products Commercialization Profile .....	175
7.4 Industrial Processes & Products Exports and Markets .....	177
7.5 Industrial Processes & Products R&D, IP Patenting, Commercialization Maturity .....	179
7.6 Industrial Processes & Products Employment and Human Resources.....	181

## **Chapter 8 – Recycling & Recovery**

8.1 Recycling & Recovery Overview .....	185
8.2 Recycling & Recovery Global Markets and Canadian Market Share.....	187
8.3 Recycling & Recovery Commercialization Profile.....	189
8.4 Recycling & Recovery Exports and Markets.....	191
8.5 Recycling & Recovery R&D, IP Patenting, Commercialization Maturity.....	192
8.6 Recycling & Recovery Employment and Human Resources .....	193

## **Chapter 9 – Remediation & Soil Treatment**

9.1 Remediaton & Soil Treatment Overview.....	197
9.2 Remediaton & Soil Treatment Global Markets and Canadian Market Share ..	199
9.3 Remediaton & Soil Treatment Commercialization Profile .....	201
9.4 Remediaton & Soil Treatment Exports and Markets.....	203
9.5 Remediaton & Soil Treatment R&D, IP Patenting, Commercialization Maturity .....	204
9.6 Remediaton & Soil Treatment Employment and Human Resources.....	205

**Chapter 10 – Transportation**

10.1 Transportation Overview ..... 209

10.2 Transportation Global Markets and Canadian Market Share..... 211

10.3 Transportation Commercialization Profile..... 213

10.4 Transportation Exports and Markets..... 215

10.5 Transportation R&D, IP Patenting, Commercialization Maturity..... 217

10.6 Transportation Employment and Human Resources ..... 219

**Chapter 11 – Water & Wastewater**

11.1 Water & Wastewater Overview..... 223

11.2 Water & Wastewater Global Markets and Canadian Market Share ..... 225

11.3 Water & Wastewater Commercialization Profile ..... 227

11.4 Water & Wastewater Exports and Markets..... 229

11.5 Water & Wastewater R&D, IP Patenting, Commercialization Maturity ..... 231

11.6 Water & Wastewater Employment and Human Resources..... 233

**Chapter 12 – Agriculture**

12.1 Agriculture Overview..... 237

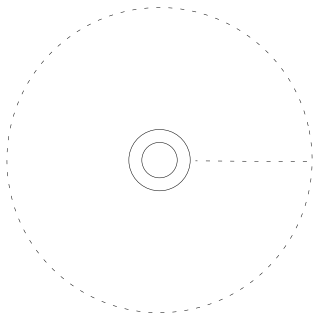
12.2 Agriculture Global Markets and Canadian Market Share ..... 239

**Acknowledgements ..... 245**

**Endnotes..... 252**

**Company Profiles (Complete Edition Only)..... 257**





## analytica advisors

Analytica Advisors is a Canadian owned and operated small and medium-sized company dedicated to research and advisory services for a growing Canadian and global economy.

For more information on how to subscribe to the 2013 Canadian Clean Technology Industry Report, please contact Céline Bak at [celine.bak@analytica-advisors.com](mailto:celine.bak@analytica-advisors.com) or +1-613-866-9157.

Ottawa  
Tel. +1 613-866-9157

Toronto  
Tel. +1 416-948-5100