

## Index

## Table of Contents

Table of Contents.....	i
List of Figures.....	v
Executive summary.....	1
1 The oil and gas industry .....	3
1.1 Introduction to the oil and gas industry.....	3
1.2 Industry players .....	5
1.2.1 International and national oil companies .....	5
1.2.2 OPEC.....	7
1.2.3 Independent exploration and production companies.....	8
1.2.4 Oilfield service companies .....	10
1.3 The oil and gas market.....	11
1.3.1 Oil and gas reserves .....	11
1.3.2 Oil and gas production.....	13
1.3.3 Oil and gas consumption .....	14
1.4 Oil and gas production and distribution.....	15
1.4.1 Exploration, development and production.....	15
1.4.2 Transportation and storage.....	17
1.4.3 Refining and marketing .....	19
2 Wireless IIoT solutions in the oil and gas sector .....	21
2.1 Wireless IIoT infrastructure in oil and gas .....	21
2.1.1 Facilities segment.....	23
2.1.2 Service segment.....	25
2.1.3 Network segment .....	27
2.2 Operations management.....	29
2.2.1 Exploration and production management .....	29
2.2.2 Distribution and marketing management.....	30
2.3 Equipment management.....	30
2.3.1 Equipment diagnostics and maintenance planning .....	31

2.3.2	Security and Safety .....	31
2.4	Regulatory compliance and reporting .....	32
2.4.1	Regulation .....	32
2.4.2	Tax collection .....	33
2.5	Business models and project strategies .....	33
3	Market forecasts and trends .....	35
3.1	Market analysis .....	35
3.1.1	Installed base and unit shipments .....	36
3.1.2	Wireless technologies .....	37
3.1.3	Regional markets .....	38
3.1.4	Major vendors.....	40
3.2	Market drivers and barriers.....	43
3.2.1	Macroeconomic environment .....	43
3.2.2	Regulatory environment .....	44
3.2.3	Competitive environment .....	45
3.2.4	Technology environment .....	45
3.3	Value chain analysis .....	46
3.3.1	Wireless IIoT and telemetry industry players .....	47
3.3.2	Industrial technology vendors.....	50
3.3.3	Wireless network operators and managed service providers.....	52
3.3.4	IoT platform and IT industry players .....	54
3.4	Future industry trends .....	57
4	Norh American vendors .....	59
4.1	AMCi Wireless.....	61
4.2	American Innovations.....	61
4.3	ATEK Access Technologies .....	63
4.4	Banner Engineering.....	64
4.5	Belden.....	65
4.6	Bentek Systems.....	67
4.7	Critical Control Energy Services.....	67
4.8	DataOnline .....	69
4.9	Digi International.....	71

4.10 Elecsys (Lindsay Corporation) ..... 73

4.11 eLynx Technologies..... 75

4.12 Emerson ..... 76

4.13 Encore Networks ..... 78

4.14 FreeWave..... 79

4.15 General Electric ..... 80

4.16 Geoforce ..... 83

4.17 High Tide Technologies..... 85

4.18 Honeywell ..... 85

4.19 Inductive Automation..... 87

4.20 MultiTech Systems ..... 88

4.21 OleumTech ..... 89

4.22 OmniMetrix ..... 91

4.23 ORBCOMM ..... 92

4.24 Pason Systems..... 94

4.25 Quake Global..... 96

4.26 Quorum Software ..... 96

4.27 Red Lion Controls (Spectris) ..... 97

4.28 Rockwell Automation ..... 99

4.29 Sierra Wireless ..... 101

4.30 SkyBitz (Ametek) ..... 103

4.31 SPOC Automation ..... 105

4.32 Varec..... 106

4.33 WellAware ..... 107

4.34 Willowglen Systems..... 108

4.35 Zedi ..... 109

4.36 ZTR Control Systems..... 110

5 European and Rest of World vendors ..... 113

5.1 ABB..... 114

5.2 Abriox..... 116

5.3 Acksys ..... 117

5.4 AIUT ..... 118

5.5	Atmos International.....	119
5.6	Dashboard .....	120
5.7	Dunraven Systems.....	121
5.8	Endress+Hauser .....	122
5.9	Eurotech .....	124
5.10	GasSecure (Dräger).....	126
5.11	HMS Networks.....	128
5.12	ISA – Intelligent Sensing Anywhere.....	129
5.13	Kingspan.....	131
5.14	Maestro Wireless Solutions .....	132
5.15	Moxa .....	133
5.16	OptaSense (QinetiQ) .....	135
5.17	Pepperl+Fuchs .....	136
5.18	Powelectrics.....	138
5.19	PSI .....	139
5.20	Racom.....	141
5.21	Schneider Electric.....	142
5.22	Servelec Technologies .....	144
5.23	Sensile Technologies .....	145
5.24	Siemens .....	146
5.25	SilentSoft.....	148
5.26	Silicon Controls .....	149
5.27	SRETT.....	150
5.28	WFS Technologies .....	151
5.29	Yokogawa .....	151
	Glossary .....	153

## Index

## List of Figures

Figure 1.1: Energy consumption by fuel (World 2017).....	4
Figure 1.2: Oil and gas industry value chain .....	5
Figure 1.3: Major integrated oil and gas companies .....	6
Figure 1.4: OPEC member countries (2019) .....	8
Figure 1.5: Major independent oil and gas operators .....	9
Figure 1.6: Major oilfield service companies .....	10
Figure 1.7: Oil and gas reserves by region (World 2017).....	12
Figure 1.8: Production and consumption of oil and gas by region (World 2017) .....	13
Figure 1.9: Consumption of oil and gas by sector (World 2016) .....	14
Figure 1.10: Active oil and gas rigs (World Jan 2009 – Feb 2019).....	16
Figure 1.11: Length of oil and gas pipelines by region (World 2019) .....	18
Figure 2.1: Overview of wireless IIoT infrastructure in oil and gas .....	22
Figure 2.2: Examples of industrial wireless devices .....	24
Figure 2.3: Example of service segment in a IIoT solution.....	26
Figure 2.4: Wireless network characteristics .....	28
Figure 3.1: IIoT device shipments and installed base by vertical (World 2018–2023) .....	36
Figure 3.2: IIoT device shipments and installed base by technology (World 2018–2023) .....	37
Figure 3.3: IIoT device shipments and installed base by region (World 2018–2023) .....	39
Figure 3.4: Major wireless IIoT vendors in the oil and gas market .....	41
Figure 3.5: Key data for wireless IIoT solution providers.....	48
Figure 3.6: M&A among oil and gas IIoT solution providers (2015–2019) .....	49
Figure 3.7: Key data for industrial technology companies active in the oil & gas market .....	51
Figure 3.8: Major IoT communication service providers .....	53
Figure 4.1: Oil and gas IIoT solution providers in North America (A–E).....	59
Figure 4.2: Oil and gas IIoT solution providers in North America (E–Z).....	60
Figure 4.3: American Innovations’ Bullhorn solution.....	62
Figure 4.4: ATEK Access Technologies’ TankScan solution.....	64
Figure 4.5: Critical Control’s SmartEFM solution.....	68

Figure 4.6: Digi International's Digi Connect Sensor+ .....	72
Figure 4.7: Elecsys' RediGate series of IoT gateways.....	74
Figure 4.8: Example of a data acquisition solution using GE MDS devices .....	82
Figure 4.9: OleumTech's solutions for wireless oilfield automation .....	90
Figure 4.10: OmniMetrix's remote pipeline monitoring solution.....	91
Figure 4.11: Pason Systems' electronic drilling recorder display .....	95
Figure 5.12: Examples of screens in WellAware's mobile application .....	107
Figure 5.1: Oil and gas IIoT solution providers in Europe and Rest of World (A–M) .....	113
Figure 5.2: Oil and gas IIoT solution providers in Europe and Rest of World (O–Y).....	114
Figure 5.3: Acksys' AirBox industrial cellular router .....	118
Figure 5.4: AIUT's remote tank monitoring solution.....	119
Figure 5.5: Dashboard's LIMPET solution .....	121
Figure 5.6: Endress+Hauser's WirelessHART gateway and adapters .....	123
Figure 5.7: GasSecure's GS01 wireless gas detector .....	127
Figure 5.8: ISA's tank monitoring solution.....	130
Figure 5.9: Maestro's cellular router in the E220 series .....	132
Figure 5.10: Moxa's solutions for remote wellhead monitoring.....	134
Figure 5.11: Pepperl+Fuchs' WirelessHART products .....	137
Figure 5.12: PSI's PSIpipelines system architecture .....	140
Figure 5.13: Racom's RipEX2 radio modem and MIDGE2 cellular router .....	141
Figure 5.14: Sensile Technologies' remote tank monitoring solution Oil Link.....	146
Figure 5.15: Silicon Controls' telemetry system Gaslog.....	150