European Biomass Industry Outlook

European Biomass to Power

Amedeo Vaccani, Zeinegul Salimova

October 5, 2016, Seville, Spain

About A. Vaccani & Partner (AVP)

AVP is an independent international management consulting company located in Switzerland, founded 24 years ago

Member of the ICFG international M&A network with over 40 offices worldwide

Key activities include:

- Management and Strategy Consulting Services, Dedicated Market Research
- Corporate Finance Services / Mergers & Acquisitions
- Mediation of Strategic Partnerships / Technology Transfers

Unique combination of transaction orientation, management consulting competence and business experience

Outstanding international team with complementary skills and business experience, highest standards with regards to professionalism and quality

Long experience in working with national and international clients on cross border mandates including complex consulting mandates

AVP has a well proven and renown track record in Renewable Energy & Environment (RE&E) and a well-qualified practice team

- RE&E is a target practice area since founding in 1992
- Strong practice team, Partners of AVP Practice Team have each over 25 years of experience in RE&E
- Strong focus on sustainability, renewable energy, waste management and water related topics
- Extensive network of industry contacts, large international network of specialists
- Excellent references and partner network in Europe, Asia, USA
- Good knowledge of key market segments and minimum “learning curve” for consulting mandates
- Established toolbox (and database) for market research and industry analysis
- Unique knowledge of what is happening in the most attractive market segments

Amedeo C. Vaccani
MBA Harvard
MS Federal Institute of technology ETH
a.vaccani@avp-group.net

- CEO ABB worldwide Business Area Resource Recovery
- CEO W+E Umwelttechnik AG
- Various Board / Advisory Board positions

Specialties

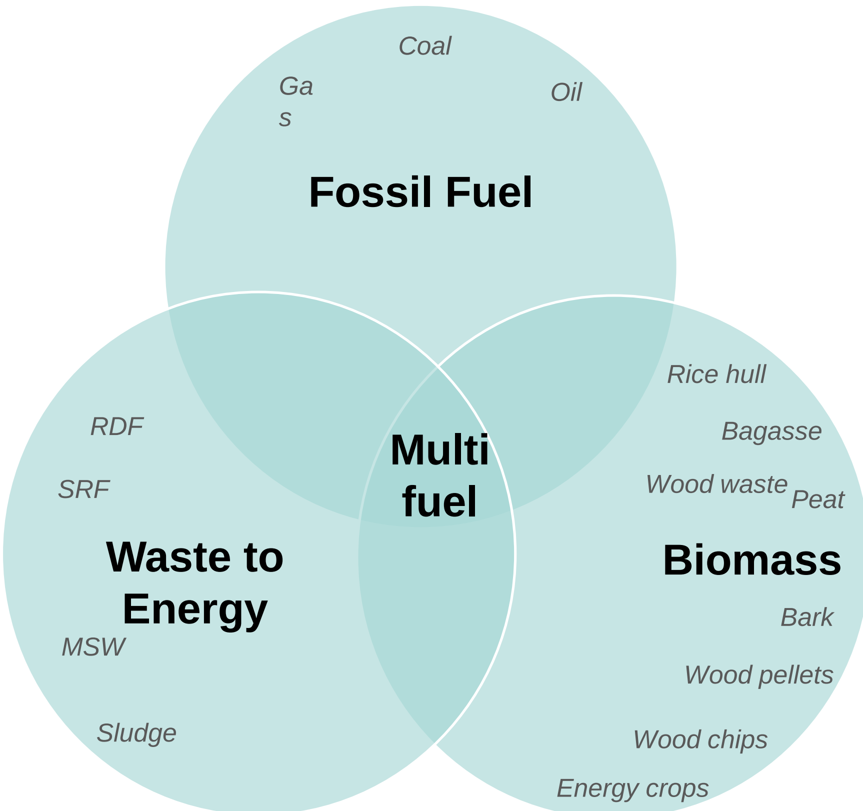
- Practice leader for AVP’s biomass, waste, multi-fuel business
- Extensive experience with all aspects of international business development:
  - Strategy development and implementation
  - Mergers & Acquisitions (M&A)
  - Strategic Cooperations and Licensing partnerships (in and out-licensing)
  - Project development
- Good personal access to many decision makers of global and regional leading market players
- Excellent access and knowledge of the International deal flow in the industry

AVaccani&Partners
Management Consultants
M&A Advisors

Key Points for Today's Discussion

- Historical Development of the Biomass Market
- Changing Landscape of the Industry Players
- Potential Market Development
- Growth Markets

What Do We Mean by “Biomass Market”?

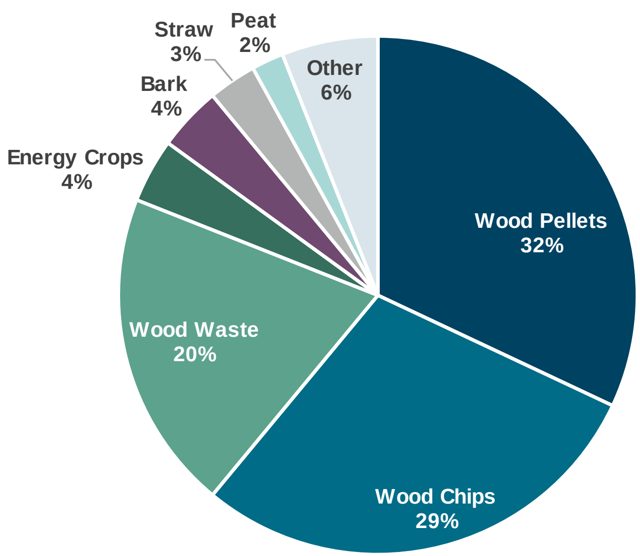


Feedstock	Moisture Content, %	Combustion Quality	Transport	Storage & Handling
Fresh forestry products	60	Low	Regional, by rail	Difficult handling
Wood chips	50-55	Low	Regional, by rail	Difficult handling
Wood Waste	50	Low	Regional	Special handling
Saw mill residues, etc.	40	Low	Local, by road	Handling can be automated
Energy crops, hay, straw, etc. after harvest	13-15	Medium	Local, by road	Special handling required to protect from humidity
Wood pellets	8-9	High	Mainly by sea, scaling is necessary	Costs are lower due to properties
Torrefied pellets	1-5	High	Mainly by sea, economies of scale required	Minimum investments

AVaccani&Partners
Management Consultants
M&A Advisors

Over 75% of Fuels used in European Biomass Plants are Wood Base

Plant Fuel Use in Units (2006 – 2015)



Source: AVP Research

Fuel type	Customers	Markets
Wood Pellets	Utilities, IPPs	Finland, Sweden, UK
Wood Chips	Utilities, IPPs	Europe, Russia and CIS
Wood Waste	Industrials, utilities IPPs	Europe, Russia and CIS
Energy Crops	Food Processing, IPPS	Southern & Western Europe
Bark	Pulp & paper	Europe, Russia and CIS
Straw	IPPs	Europe
Peat	Municipalities, utilities	Finland

AVaccani&Partners
Management Consultants
M&A Advisors

Factors Impacting the Market Development in Europe

Market Drivers

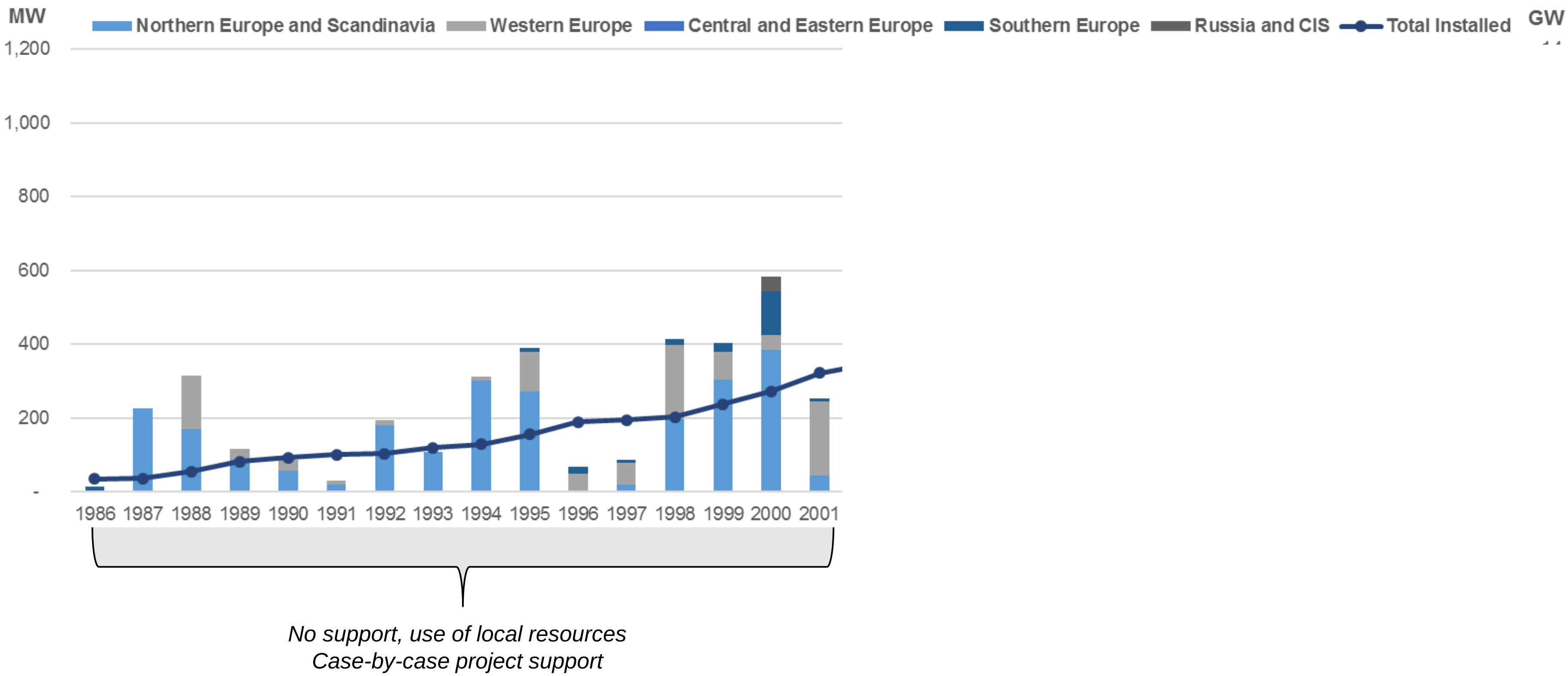
		Impact
Renewable Energy Requirement	EU Renewable Energy Targets & GHG emissions reductions	●
Government Support	Subsidies, renewable certificates & tax breaks	●
Baseload Energy	Reliable energy available on demand	◑
Energy Efficiency drive for CHP	Growth in biomass – fired CHPs	●

Market Challenges

		Impact
Biomass Sustainability Criteria	Issues over biomass sustainability post-2020	●
High Transportation & Storage Costs	Development of supply chain required to resolve	●
Access to Bankable Feedstock	Volatility of biomass production (weather & seasonality) and price	●
Government Policy Uncertainty	Support for other technology impacts support for biomass	◑

AVaccani&Partners
Management Consultants
M&A Advisors

Annual Biomass Awards in Europe for the last 30 years

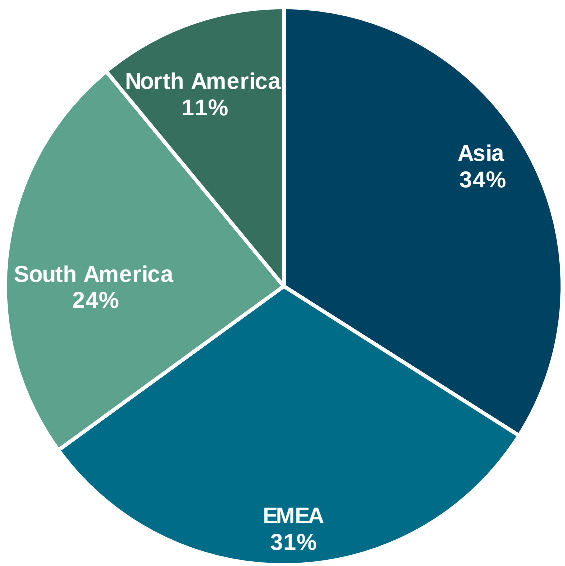


Source: AVP Research

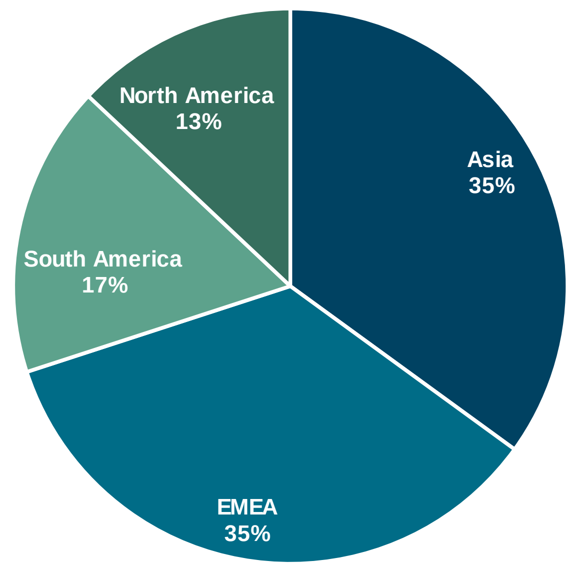
AVaccani&Partners
Management Consultants
M&A Advisors

Despite a Late Start, Asia is the Largest Biomass Market in the World

Global Biomass Market Share Last 10 Years Contract Awards MW (2006 – 2015)



Global Biomass Market Share Last 5 Years Contract Awards MW (2011 – 2015)

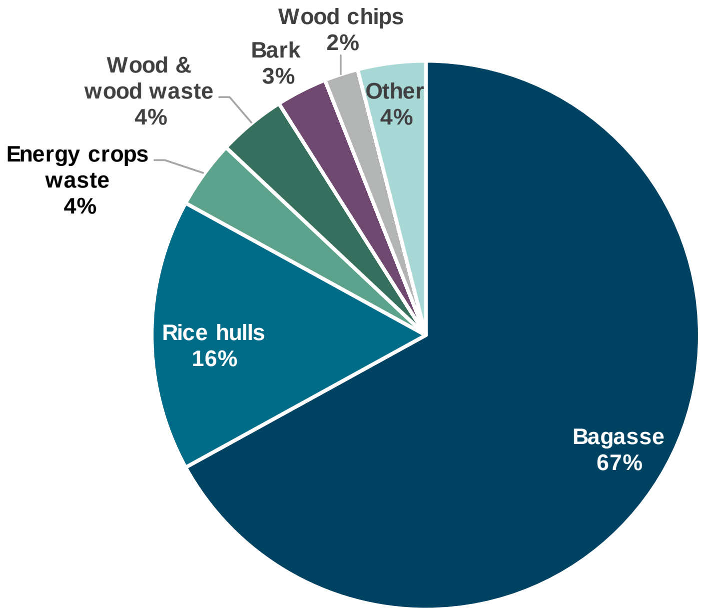


Source: AVP Research

AVaccani&Partners
Management Consultants
M&A Advisors

Due to Market Specifics 67% of Biomass Plants in Asia Use Bagasse

Plant Fuel Use in Units (2006 – 2015)

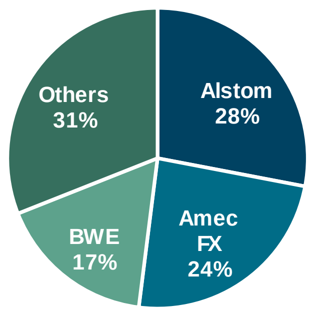


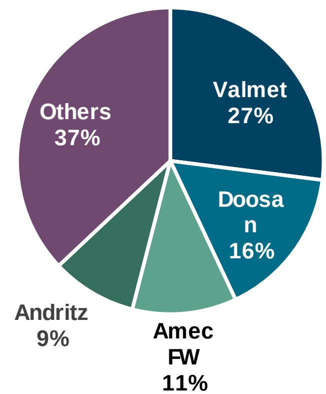
Source: AVP Research

Fuel type	Customers	Markets
Bagasse	Sugar Mills	Across all Asia
Rice Hulls	Rice Mills	India, Thailand mainly
Energy Crops Waste	Food Processing, IPPS	Across all Asia
Wood Waste	Industrials, utilities	Malaysia, South Korea mainly
Bark	Pulp & paper	Indonesia, Thailand
Wood Chips	Utilities, IPPs	Phillipines, South Korea, Thailand

Changing Market Landscape

	1986 – 2005	2006 – 2015
OEMs	Number of boiler suppliers >30	Number of boiler suppliers >40

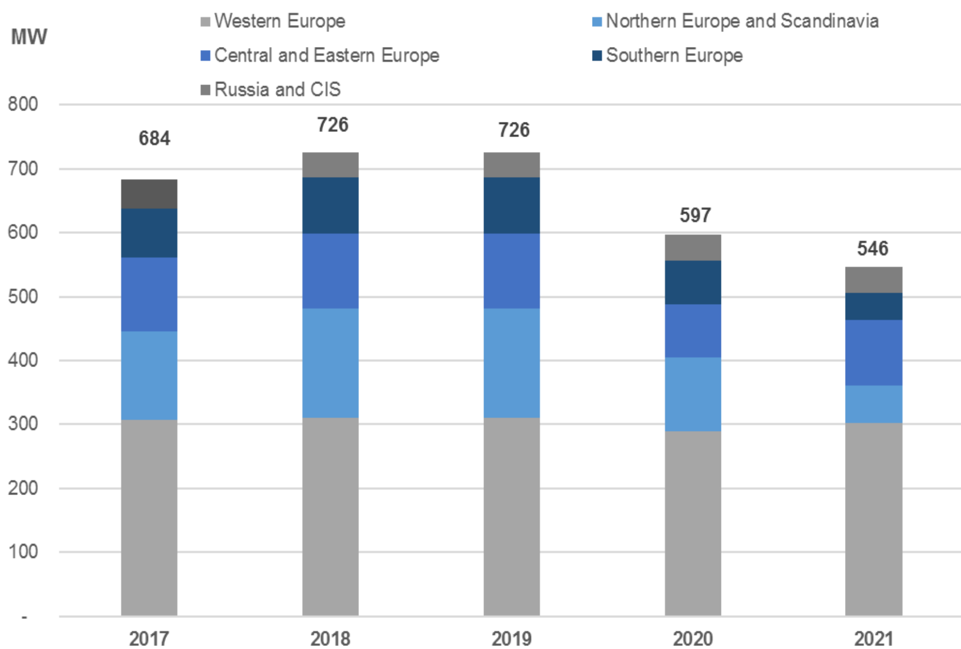




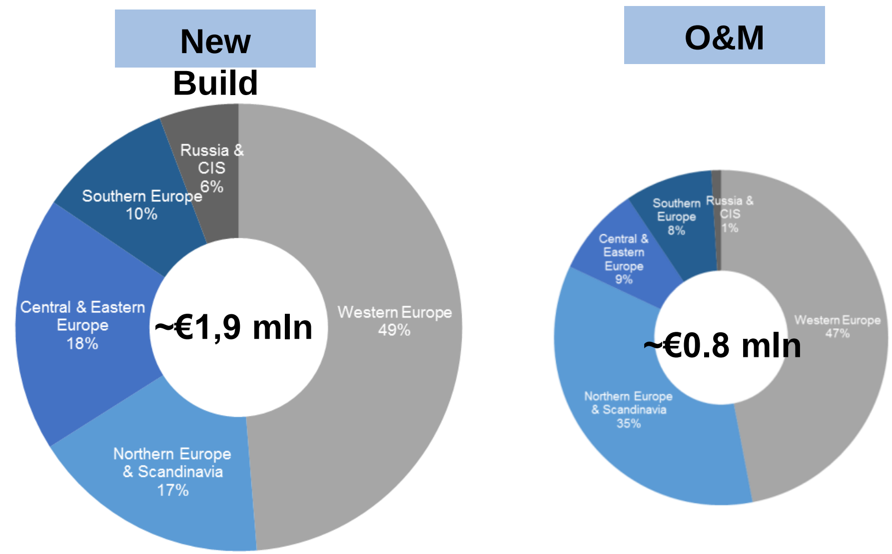
Developers

AVP View on the Market Development in Europe for the Next 5 years

Forecasted Annual Awards



Annual Market Value Split



Source: AVP Research

AVaccani&Partners
Management Consultants
M&A Advisors

Finland
- FIT, price premium
- 26 – 50 MW

Sweden
- ROCs
- 26 - 50 MW

Russia
- Limited support
- 11 – 25 MW

Country Attractiveness

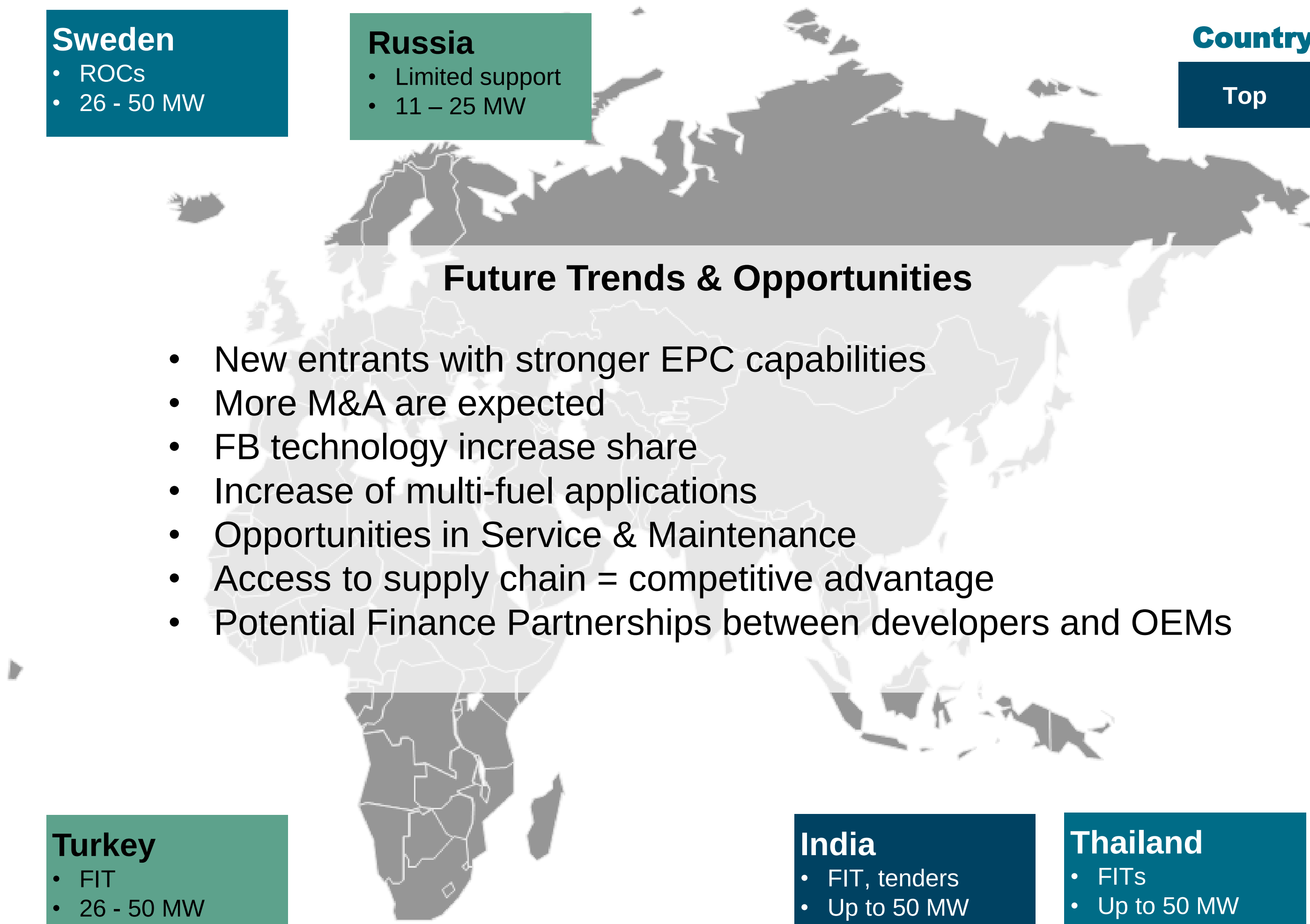
Top	High	Emerging

Denmark
- Limited support
- 5 – 25 MW

UK
- ROCs, CFD
- Up to 50MW

Germany
- Tenders, premium
- 11 – 25 MW

Poland
- Auctions
- Up to 50 MW



Future Trends & Opportunities

- New entrants with stronger EPC capabilities
- More M&A are expected
- FB technology increase share
- Increase of multi-fuel applications
- Opportunities in Service & Maintenance
- Access to supply chain = competitive advantage
- Potential Finance Partnerships between developers and OEMs

Turkey
- FIT
- 26 - 50 MW

India
- FIT, tenders
- Up to 50 MW

Thailand
- FITs
- Up to 50 MW

Japan
- FIT
- Over 50 MW

China
- FIT
- 11 – 50 MW

South Korea
- RECs, tendering
- Up to 50 MW

Indonesia
- FIT, quotas
- 5 – 10 MW

Thank you for your attention – QUESTIONS?