Brazil Market Overview:
Timber and Forest Products

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Brazil White Paper

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Executive Summary

Economic and Business Environment

- The Brazilian economy experienced a major acceleration in its rate of growth in the 2000s. Between 2000 and 2012, real annual growth in Brazil’s GDP averaged 3.4%, up from an average rate of growth of 1.7% per year in the period 1990-1999. Other indicators of Brazil’s economic progress over the past decade include: the Brazilian unemployment rate dropping from 10% in 2005 to 5.5% in 2011; direct foreign investment in Brazil rising from an average of US$14 billion per year in 1991-2000 to US$57 billion per year in 2008-2012 (reaching a peak of US$76 billion in 2012).

- Brazil’s economy is primarily focused on its large domestic markets, with exports of goods and services representing only 12 percent of GDP. Brazil’s relatively limited exposure to international markets helped insulate its economy from the negative impacts of the GFC.

- Over the past three years, the Brazilian economy hit a rough patch, marked by slower growth, rising inflation, and a sharp depreciation in its currency. In 2012, growth in Brazil’s real GDP slowed to a 0.9% annual rate, and is estimated to have only grown at 2% in 2013. Since 2011, the BRL has been negatively impacted by weaker global markets for minerals and agricultural products and a shift in global capital flows away from emerging markets. Since mid-2011, the BRL has steadily lost ground against the USD and by December of 2013, at 2.34 BRL/USD, had declined 32 percent.

- Over the next two years, Brazil’s economy will receive a boost from government funded infrastructure projects and construction tied to hosting the 2014 FIFA World Cup and the 2016 summer Olympic Games. The proposed government investment program would include spending US $44 billion on ports, airports, railways and roads in both 2014 and 2015.

- Over the medium term, the Brazilian economy will be facing a number of challenges: a slower rate of expansion in its labor pool; Brazil’s relatively low saving rate compared to other emerging economies will limit the availability of domestic capital; and a continued need to attract foreign investment to boost productivity.

- To improve the business climate so as to attract the necessary foreign investment, Brazil needs to implement broad reforms, including: simplifying its tax code; lowering tax rates; and reducing the costs of compliance.

Timber Supply

- The majority of Brazil’s total land area is occupied by native forests, but the country’s commercial timber production is highly concentrated on a much smaller area of land
committed to plantation forestry. Plantation forestry in Brazil is practiced on just 7 million hectares, accounting for less than 1% of Brazil’s total land area.

- Brazil’s forest plantations produce: 100% of the wood fiber for the Brazilian pulp and paper industry; over two-thirds of the wood for the production of charcoal; 100% of the raw material for softwood lumber; and a high percentage of the timber utilized for commodity plywood and wood panel producers.

- Eucalyptus, the dominant commercial species grown in Brazil, is planted on 4.9 million hectares, accounting for 70% of the total area of timber plantations. Pine plantations occupy 1.64 million hectares, representing 23% of the total timber plantation area.

- Brazil’s timber plantations are characterized by high productivity and short growing cycles, which results in levels of sustainable timber production comparable to regions with more extensive areas of commercial forests. Although Brazil’s total timber plantation area (eucalyptus and pine) is roughly 25% of the area of the U.S. South’s pine forest, Brazil’s total production of timber from plantations in 2012 exceeded the total softwood timber production in the U.S. South.

- The age distribution of Brazil’s pine resource is skewed toward older and generally poorly managed pine forests. The current age structure and condition of Brazil’s pine plantations are a legacy of government incentive (tax offset) programs in effect between 1966 and 1988 under which a large component of the pine resource was planted. After the government program ended, pine plantation establishment rates dropped sharply.

- Since 2000, the area of Eucalyptus plantations in Brazil has expanded rapidly, averaging 180,000 hectares per year. Over the same period, the area of Pine plantations contracted by about 23,000 hectares per year. Based on conservative assumptions (no net increase in acreage and stable yields), Brazil’s annual production of Eucalyptus is projected to reach over 200 million cubic meters per year in the next decade, a 60% increase from 2012. In contrast, Brazil’s Pine production is expected to remain relatively flat going forward.

**Timber Demand**

*Industrial Roundwood*

- Brazil’s industrial roundwood production increased from 103 million cubic meters in 2000 to 147 million cubic meters in 2012. This ramp up in production was almost all hardwood, and reflected the substantial investment in the country’s Eucalyptus plantation resource.

- Reflecting the increasing role of plantation Eucalyptus and more limitations on the harvest of native hardwood tropical forests, the total output of Brazil’s hardwood resource has steadily moved towards production of short-rotation pulpwood. In 2012, pulpwood accounted for 65% of Brazil’s hardwood industrial roundwood production up from 50% in
2000, and the hardwood share of total pulpwood production has trended up from 65% in 1995 to 87% in 2012.

**Pulpwood**

- The two most important markets for Brazil’s pulpwood are pulp and charcoal. Up until 2005, charcoal production in Brazil was nearly of the same magnitude as pulp production. Pulp production has continued to expand, but charcoal production experienced a decline in the second half of the 2000s, and by 2012, pulp mills consumed roughly 70% of Brazil’s total pulpwood production.

- Prospects for a strong revival of Brazil’s charcoal industry remains clouded. The key market for Brazil’s charcoal is domestic pig iron production, a substantial proportion of which is shipped to the U.S. Since peaking in 2006, U.S. imports of pig iron have dropped by 40%, and are not expected to recover as lower prices for natural gas in the U.S. have reduced the rationale for using imported pig iron as a low cost substitute for domestic crude steel. Brazilian charcoal demand will also face challenges in domestic markets as Brazilian steel producers confront stiff competition in an over-supplied global market.

- The principal driver of Brazilian pulpwood demand has been the strong, sustained growth in pulp production, which increased from 3.4 million tonnes in 1980 to 14.4 million tonnes in 2012. Brazilian pulp production has grown by competing in global markets, with exports as a share of total pulp production increasing from an average of 27% in the 1980s to 59% in 2011-2012.

- Continuing to grow pulp exports at the pace experienced in the 2000s will be difficult for Brazil. Prospects in Europe will be constrained by the extended economic downturn, while the demand from China will be moderated by the significant expansion of its own domestic pulp capacity and a slower pace in overall economic growth.

- Domestic markets for pulp in Brazil are expected to grow only modestly. After more than doubling between 1980 and 2008, domestic consumption of pulp in Brazil has been flat. Increasing utilization of recovered paper and weak markets for graphic papers (newsprint and printing and writing papers) have held Brazilian domestic consumption of pulp in check.

**Sawlogs**

- Growth in Brazil’s production of softwood sawlogs and solid wood products (lumber and wood panels) over the past decade has been relatively modest. Growth in the lumber sector has been focused on expanded production of softwood lumber, with the species mix shifting from 20% softwood in 1990 to 36% in 2012. Brazil’s softwood lumber production increased from 2.8 million cubic meters in 1990 to a peak of 9.6 in 2007, before succumbing to the GFC, and slipping 12% between 2007 and 2009.
• By 2012, domestic consumption of softwood lumber in Brazil recovered and was slightly higher than the 2007 peak volume, but export demand has remained weak. Exports accounted for on average 14% of total production in the period 2001-2010, and the U.S. has been the number one export destination for Brazil’s softwood lumber.

• The outlook for Brazil’s softwood lumber sector is positive, based on Brazil’s ongoing trend of urbanization and proposed investment in infrastructure, as well as the potential boost to exports from the continuing revival in U.S. housing markets.

• Brazil’s plywood and veneer sector experienced major investment and growth from the mid-1990s to the mid-2000s, with production increasing from 1.9 million cubic meters in 1995 to 4.3 million cubic meters in 2005. This growth was almost exclusively driven by exports, and by the middle of the 2000s, exports represented over 80% of total plywood production.

• Since 2005, Brazilian plywood and veneer production has trended lower as a result of declining exports. With a substantive recovery in residential construction markets in the U.S. occurring and European economies once again showing positive growth, Brazilian plywood exports should benefit.

Energy Wood

• Industrial fuelwood is a major component of Brazil’s commercial timber demand, with consumption of a similar magnitude as pulp and charcoal. Over the past decade, fuelwood consumption has expanded in a number of industrial sectors, including agriculture, food processing and ceramics, and opportunities exist to further increase the use of industrial fuelwood sourced from plantation Eucalyptus.

• Fuelwood is the principal energy source for drying and processing grains and soya. Brazil’s export oriented soya harvest has increased dramatically over the past decade and is expected to increase by another 33% over the next ten years. Environmental groups are pressuring major multi-national grain traders to reduce the use of fuelwood sourced from native forests and shift to material from sustainably managed plantations. Brazil also has the potential to become a major supplier of wood pellets to European power plants.

Industry Structure

• The four largest Brazilian forest product companies are Eldorado Celulose e Papel, Fibria Celulose, Klabin and Suzano Papel e Celulose. Fibria and Eldorado are exclusively focused on the production of bleached hardwood kraft pulp. Suzano is a major pulp producer (the second largest producer of hardwood kraft market pulp in the world), and also produces a variety of printing and writing and packaging grades of paper. Klabin is the largest producer of linerboard, cartonboard, industrial bags and corrugated boxes in Brazil and also produces a small volume of non-integrated market pulp.
• The combined production of Fibria, Suzano and Eldorado places Brazil in the preeminent position in global hardwood market pulp markets. Brazil accounts for approximately 1/3 of global production of hardwood market pulp and roughly half of world production of Eucalyptus market pulp.

• In recent years, all four of the Brazilian companies and CMPC (a Chilean company with one pulp mill located in Brazil) have been actively investing in expanded bleached Eucalyptus kraft pulp capacity in Brazil and have additional mills planned or in development.

**Timber Prices**

*Eucalyptus Pulpwood*

• Eucalyptus pulpwood prices in Brazil are strongly linked to movements in the price of bleached Eucalyptus market pulp (BEKP). Eucalyptus market pulp prices rose from USD $610 per tonne in the first quarter of 2001 to a peak of $917 per tonne in the second quarter of 2011, an increase of 50%. The upward trajectory of BEKP prices built on the solid growth in global demand for the specific paper grades (tissue and hygiene) in which BEKP had established clear performance advantages. In addition, BEKP pulp prices were supported over the past decade by the dramatic growth of China’s imports.

• Since mid-2011, Brazilian Eucalyptus pulpwood prices have made a significant downward correction, slipping from USD $23 to USD $15 in the third quarter of 2013. The recent weakness in Brazilian pulpwood prices reflects the sagging domestic economy, negative impacts of slower growth in the key China export market, and a major depreciation in the Brazilian real.

• Between now and the end of the decade, Eucalyptus pulpwood prices in Brazil will find new support from the next round of scheduled major pulp mill start-ups, which are expected to add 13.3 million tons of new capacity in the next four years.

• The future trajectory of Eucalyptus pulpwood prices in Brazil will be region specific. Price appreciation will be strongest in regions where Eucalyptus pulp capacity additions occur and where producers have a greater dependency on timber supplies outside of their direct ownership or control.

*Pine Sawlogs*

• Between 2002 and 2005, Brazilian Pine sawlog prices increased significantly, rising 70% in BRL and 150% in USD terms, supported by strong growth in domestic consumption of softwood lumber and surging exports of wood products tied to the U.S. housing boom.
• With the onset of the GFC, Pine sawtimber prices dropped back to the levels of 2002, as exports of both softwood lumber and plywood fell sharply. In local currency, Brazilian Pine sawlog prices have continued to drift lower since 2009, reflecting relatively flat domestic and export demand for solid wood products and the appreciation of the BRL relative to the USD.

• Over the next few years, Brazilian Pine sawlog prices will benefit from government sponsored infrastructure projects; construction associated with hosting the World Cup in 2014 and the Summer Olympics in 2016; and restored competitiveness of Brazil’s wood products sector in global markets with the ongoing depreciation of the BRL versus the USD.
Economic and Business Environment - Overview and Outlook

Economic Overview

Brazil is the sixth largest economy in the world (as measured by nominal GDP in US$) and has the fifth largest population. Since 2000, the Brazilian economy has made great strides forward, including; a major acceleration in its rate of growth in domestic output and a significant increase in the volume and value of its global trade. In the period 2000-2012, real annual growth in Brazil’s GDP averaged 3.4% (measured in $US PPP), up from an average rate of growth of 1.7% per year in the period 1990-1999. Between 2000 and 2012, real per capita GDP ($US base year 2012) more than doubled, rising from $5,021 to $11,462. In the past decade, Brazil’s merchandise exports also experienced robust growth, rising from an inflation adjusted annual average of US $67 billion (2012 base year) in 1991-2000 to US$252 billion per year in 2011-2012.

Brazil’s strong economic performance over the past decade has built upon the stabilization in the country’s political and financial fundamentals. The dramatic easing of inflation pressures in Brazil that occurred in the 2000s set the stage for improved economic growth and investment. In the period 2003-2012, the average annual change in Brazil’s CPI dropped to a manageable 6.4%, down from an average of 648.6% per year over the previous twenty year. Since the mid-2000s, Brazil's unemployment rate has trended lower and foreign investment has increased substantially. Between 2005 and 2011, the Brazilian unemployment rate dropped from 10% to 5.5%, and direct foreign investment in Brazil rose from an average of US$14 billion per year in 1991-2000 to US$57 billion per year in 2008-2012 (reaching a peak of US$76 billion in 2012).

Brazil’s strong economic performance over the past decade has placed it solidly among the group of large, fast growing emerging economies. Figure 1 and Table 1 place Brazil in a global context, providing comparisons with a number of emerging economies of similar scale: Indonesia, Mexico, Poland, Russia, and Turkey. All of the comparison countries with the exception of Turkey have some potential as targets for international timberland investment.

Brazil, with a population of 195 million people, is significantly more populous than Poland (38 million), Turkey (72 million) and Mexico (108 million), and falls between the populations of Russia (143 million) and Indonesia (240 million). Over the period 1950 to 2005, the population of Brazil more than tripled, growing from 51 million to approximately 187 million inhabitants, an increase of over 2% per year. A legacy of the robust growth in the population over the second half of the past century has been the young, expanding labor pool that helped fuel Brazil’s strong economic growth in the 2000s. Over the past couple of decades, the rate of population growth has slowed considerably and in 2011 had moderated to a rate of just 0.9% per year. About 84% of Brazil’s population lives in urban areas.

In 2011, Brazil’s GDP reached $2.25 trillion (US current dollars), nearly on-par with Russia, 40% larger than Mexico, roughly twice the size of the economies of Indonesia and Turkey, and nearly
three times the size of Poland (Figure 1). From 2002 through 2011, Brazil’s real GDP has grown at an average rate of 3.7% per year (in constant US $s), resulting in a 40% increase in real GDP over that period. Although Brazil’s economic performance since 2002 has been a marked improvement from the previous two decades, economic growth in Brazil has been in the range experienced by other emerging economies, with Brazil being outpaced by Indonesia, Poland, Russia and Turkey, but performing significantly better than Mexico (Table 1). Brazil’s recent record of economic growth relative to its peers (particularly in the case of Mexico, Russia and Turkey) was helped by its ability to successfully weather the aftermath of the Global Economic Crisis (Figure 2).

![Figure 1: 2011 GDP and Population Country Comparisons](image)

**Table 1: Growth in Real GDP and Per Capita Income – Country Comparisons**

<table>
<thead>
<tr>
<th>Country</th>
<th>Avg. Annual % Change in Real GDP 2002-2011, US $s, constant prices and PPPs</th>
<th>2011 Gross National per capita income, US $s, current prices</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turkey</td>
<td>5.8%</td>
<td>$10,477</td>
</tr>
<tr>
<td>Indonesia</td>
<td>5.4%</td>
<td>$3,511</td>
</tr>
<tr>
<td>Russia</td>
<td>4.8%</td>
<td>$13,355</td>
</tr>
<tr>
<td>Poland</td>
<td>4.2%</td>
<td>$13,384</td>
</tr>
<tr>
<td>Brazil</td>
<td>3.7%</td>
<td>$12,584</td>
</tr>
<tr>
<td>Mexico</td>
<td>1.9%</td>
<td>$10,034</td>
</tr>
</tbody>
</table>

Source: IMF
The strong, sustained growth that Brazil experienced over the past decade markedly improved living standards. Brazil’s gross national income measured on a per capita basis in 2011 was reported by IMF as US$ 12,584, which was 4.5 times greater than ten years earlier (US$2,822 in 2002). Brazil’s gains in per capita GDP are in sharp contrast to the slow growth experienced in Mexico over the past decade. In 2002, per capita GDP in Mexico was US$7,436, 2.6 times greater than in Brazil. Over the past ten years, Mexican per capita GDP only grew 35%, leaving Mexico in 2011 with per capita GDP 20% lower than in Brazil (Table 1).

The implementation in 1994 of the economic program, “Plano Real” of Fernando Henrique Cardoso, then Minister of Finance, was a turning point in the direction of Brazil’s economy. This policy shift laid the foundation for the strong growth of the past decade. Cardoso’s plan to stabilize the Brazilian economy was centered on the introduction of a new currency, the “real”. The real was targeted at a relatively high-valuation to the U.S. dollar, and was supported by tighter and more conservative fiscal and monetary policies. Under the plan, government expenses were restricted and interest rates were increased. The high interest rates attracted a sustained flow of foreign capital needed to finance the current account deficit and increased the country’s international reserves. The success of the “Plano Real” in curbing inflation, led to Cardoso being elected president in 1994, and again in 1998, ushering in a period of sustained, political stability. Cardoso’s conservative economic policies were largely continued by his successor, Luis Inacio Lula da Silva, who was elected in 2002 and re-elected in 2006.
Over the past decade, Brazil’s success in reducing its dependence on imported petroleum has also been a contributing factor to the economy’s forward progress. In 2006-2007, Brazil became self-sufficient in oil, where previously imports accounted for more than 70% of the country’s oil needs. Further insulating the economy from oil price shocks, Brazil has actively developed production of non-fossil fuel energy, including hydro and nuclear. Existing hydroelectric power provides 90% of the nation’s electricity. Brazil’s third nuclear power plant is scheduled to begin operations in 2014, and plans are in place to build 19 more nuclear plants by the year 2020.

Brazil’s economy is diverse and focused on its domestic markets, with the service sector accounting for 67% of GDP. A key component of Brazil’s large and sophisticated service industry is a well-developed banking and financial services sector. In 2008, the São Paulo Stock Exchange (Bovespa) and the São Paulo-based Brazilian Mercantile and Futures Exchange (BM&F) merged, creating BM&FBOVESPA, one of the largest stock exchanges in the world.

Brazil’s industrial sector accounts for 27.5% of GDP, and is the second biggest industrial sector in the Americas, producing a wide range of products, including aircraft, automobiles, cement, computers, consumer durables, petrochemicals and steel. Brazil has extensive, proven mineral resources, including large iron and manganese reserves as well as major deposits of nickel, tin, chromite, uranium, bauxite, beryllium, copper, lead, tungsten, zinc and gold. These mineral resources are an important source of raw material for Brazil’s domestic industries and off-shore export. An exception to Brazil’s mineral bounty is its very limited domestic supply of coking-grade coal which is required in the steel industry and is almost exclusively imported.

Agriculture represents just 5.5% of Brazil’s total GDP, but has been one of the most dynamic sectors of the Brazilian economy over the past decade, with agribusiness (agriculture and cattle-raising) growing at an annual rate a 3.6 per cent. Agricultural commodities have been a major contributor to the growth in Brazilian exports over the past decade, allowing Brazil to take advantage of strong global demand (particularly in China) for agricultural commodities.

Brazil’s economy is primarily inwardly focused, servicing a domestic market which in 2011 was the seventh largest in the world. Even with the growth in Brazilian international trade over the past decade, exports of goods and services represent only 11.7% of Brazil’s GDP. Brazil’s exposure to international markets is considerably smaller than other peer emerging economies (Table 2). Out of 144 countries covered in the World Economic Forum’s Global Competitiveness Report, Brazil ranked 140 in exports as a percentage of GDP, just behind the U.S. at 138.

Although exports are a relatively small component of Brazil’s total economy, Brazil has established major positions in world markets for a number of agricultural and mineral commodities. Brazil is responsible for; roughly 25% of global exports of raw cane and refined sugar; 80% of the trade in orange juice; and leads the world in exports of soybean, beef and chicken. Other important exports for Brazil are iron ore, petroleum, pulp, ethanol, cars and aircraft. In recent years, the growth in
exports in the agricultural and mining sectors has contributed to Brazil’s trade surpluses, supported gains in currency and facilitated paying down the country’s external debt.

<table>
<thead>
<tr>
<th>Country</th>
<th>Exports as % of GDP, 2011</th>
<th>Global Competitiveness Ranking, out of 144 countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poland</td>
<td>43.6%</td>
<td>41</td>
</tr>
<tr>
<td>Mexico</td>
<td>31.6%</td>
<td>53</td>
</tr>
<tr>
<td>Russia</td>
<td>31.1%</td>
<td>67</td>
</tr>
<tr>
<td>Indonesia</td>
<td>26.2%</td>
<td>50</td>
</tr>
<tr>
<td>Turkey</td>
<td>22.2%</td>
<td>43</td>
</tr>
<tr>
<td>Brazil</td>
<td>11.7%</td>
<td>48</td>
</tr>
</tbody>
</table>


As Brazil has achieved a more stable political, social and economic environment for private-sector business, its competitive position in global markets has improved. In their most recent (2012-2013) Global Competitiveness Report, the World Economic Forum ranked Brazil 48 out of 144 countries. Brazil’s current competitiveness ranking marks a significant increase from the World Forum’s 2008-2009 Report, in which Brazil ranked 64 (out of 134), the lowest ranked country compared to its peer group countries. By 2012-2013, Brazil’s competitive position in global markets had moved ahead of Russia, Mexico and Indonesia (Table 2).

The Global Competitiveness Report also reported the factors in their survey that remain the greatest hurdles for doing business in Brazil: tax regulations; inadequate supply of infrastructure; tax rates; inefficient government bureaucracy; restrictive labor regulations; inadequately educated workforce; and corruption.

Corruption is generally recognized as a significant problem in operating a business in Brazil. In October of 2010, the Latin Business Chronicle reported that corruption in Brazil represented a U.S. $41 billion annual cost to the economy and that 69.9% of the country's firms identified the issue as a major constraint in successfully penetrating global markets. Transparency International's Corruption Perceptions Index ranked Brazil 72nd out of 177 countries in 2013, putting Brazil roughly in the middle of its peer group of emerging economies (Table 3).
In recent years, Brazil’s government has directly addressed the issues of corruption and has passed a number of pieces of legislation to reduce its prevalence, including:

- The Clean Company Act, making companies liable for corruption at home and abroad. Under the new regulations, a company can be fined up to 20% of its gross revenues, be prohibited from signing contracts with the public sector, and prevented from taking loans from state banks, among other restrictions;
- The Clean Records Law which makes persons criminally convicted by a judicial or administrative court ineligible to run for political office for eight consecutive years at any level;
- A freedom of information law, passed in 2012, that guarantees Brazilian citizens access to federal, state, provincial, and municipal public documents.

The credibility of Brazil’s judicial system was boosted by the guilty verdicts issued in 2012 in Brazil’s largest corruption trial, known as the “mensalão scandal” and with the incarceration of a number of the defendants at the end of 2013. Twenty-five people out of the 40 defendants, many former top political figures, were found guilty of using public funds to pay lawmakers monthly bribes.

Over the past three years, the Brazilian economy has hit a rough patch, marked by slower growth, rising inflation and a sharp depreciation in the currency. In 2010, Brazil’s real GDP grew at a strong 7.5% as it bounced back from the Global Financial Crisis (GFC), but then lost momentum, stepping down to a 0.9% annual rate in 2012. In 2013, economic growth continued to disappoint, with GDP estimated to grow at 2% for the year, based on the first three quarters. Reacting to the slumping economy, the Brazilian government under President Dilma Rousseff instituted a number of policy measures to stimulate the economy. These simulative measures included: a series of tax cuts; reducing the benchmark interest rate to a decades-low of 7.25%; and raising the minimum wage.
10% in 2012 and 9% in 2013. Although these policies were successful in supporting domestic consumption, high levels of uncertainty surrounding growth prospects both in the domestic and global markets have restrained industry from making capital investments.

Even though economic growth remained weak in 2013, Brazilian inflation has trended higher, and by the second half of the year, CPI was over 6% at an annual rate and near the upper ceiling of the official target. Factors pushing Brazilian inflation higher are: healthy demand for goods and services supported by the government’s stimulus measures; and rising labor costs, boosted by a low unemployment rate in combination with legislated increases in the minimum wage. The Brazilian currency, the real, has also been in retreat since peaking in the summer of 2011, and by the end of 2013 had depreciated by 35% relative to the US dollar. The weakening Brazilian currency is also adding to inflationary pressures.

In response to the deteriorating economic situation and concerns about a resurgence of inflation, the Brazilian government has recently begun to tighten both fiscal and monetary policy, scaling back government stimulus and raising interest rates. Memories of Brazil’s hyperinflation of the 1990s are still very sharp in the minds of both the public and policy makers, raising concerns that the hard won economic progress that has been realized over the past two decades could be reversed. Since April 2013, the Brazilian central bank has raised interest rates 3.75 percentage points, bringing them up to 10% in December 2013. In the short-term, the Brazilian government will be limited in its ability to move aggressively to fight inflation and support the real. Higher interest rates will likely slow growth in the economy and could further undermine support for the current administration of President Rousseff, who will be up for re-election in 2014. In June of 2013, numerous demonstrations erupted in Brazil to protest a range of economic and social issues, with hundreds of thousands of people participating in several cities.

Over the next two years, Brazil’s economy will be gaining a boost from already committed government investment in infrastructure projects tied to hosting the 2014 FIFA World Cup and the 2016 summer Olympic Games. In addition, the government has proposed an ambitious investment program that would include spending US $44 billion on ports, airports, railways and roads in both 2014 and 2015.

Looking out over the medium term, the Brazilian economy will be challenged to maintain economic growth at the levels experienced in the 2000s. Over the next decade, the labor pool will be expanding at a slower rate, reflecting demographic trends and the fact that the participation rate has already reached a high level. Growth will need to come from increased investment that will be needed to generate gains in productivity. Given Brazil’s relatively low savings rate compared to other emerging economies, the needed investments in infrastructure and industrial development will depend on continuing to attract foreign investment.

To improve the business climate and continue to attract the necessary foreign investment, Brazil will need to reduce its burdensome tax structure by implementing broad reforms, including: simplifying
the tax code; lowering tax rates; and reducing the costs of compliance. To maintain its competitive position in global markets, Brazil will need to moderate the large and sustained rise in unit labor costs that has occurred in recent years, which will require a review and modification of the current mechanisms for adjusting the minimum wage.

**Brazilian Real**

Since the creation of the Brazilian real (BRL) in 1994, Brazil’s currency has experienced significant volatility (Figure 1). Initially pegged to the U.S. dollar (USD) at 1:1, by 1997 the real was moved to a managed floating exchange rate, to weather an economic downturn that followed from the Asian and Russian financial crises of the period. In January of 1999, Brazil’s exchange rate regime reverted to a free-float with the U.S. Dollar, and has remained under this regime through today.

After moving to a free-float with the USD in 1999, the BRL experienced bouts of extreme volatility. Within the 18 months between February 2000 and October 2001, the BRL fell from 1.78 BRL/USD to 2.73 BRL/USD. And again in more dramatic fashion, the BRL depreciated by 40% in 7 months – from 2.35 BRL/USD in March 2002, falling to its historic monthly low of 3.69 BRL /USD in October of that same year.

From this low point until the on-set of the global financial crisis (GFC) in the second half of 2008, the BRL steadily appreciated, gaining 57% against the USD over six years, reaching 1.62 BRL/USD in June of 2008. The strengthening in the real in the period 2002-2008 reflected improvements in Brazil’s domestic economy as well a movement to a positive trade balance. During this period, the USD was losing ground against all major currencies due to the U.S. deteriorating current account balance and accommodative monetary policy.

![Figure 3: Historical Nominal BRL/USD](image-url)
With the on-set of the global financial crisis in the second half of 2008, the BRL experienced a sharp temporary drop, moving from 1.62 BRL/USD in June of 2008 to 2.40 BRL/USD in December, as the USD benefitted from its position as a safe haven during the GFC. By October of 2009, the Brazilian real had recovered to 1.71. The rapid recovery of the BRL in the wake of the GFC was supported by Brazil’s relatively limited dependence on overseas markets, the continuing strength of its domestic economy, and its ability to continue to attract foreign capital. Throughout the next two years, the real continued to strengthen against the dollar, reaching 1.59 BRL/USD in June of 2011.

Since July of 2011, the BRL has steadily lost ground against the USD. By December of 2013, at 2.34 BRL/USD, the real had declined 32% from July of 2011. Since mid-2011, the pace of economic expansion in emerging-markets has slowed, impacted by the slow pace of recovery in Europe and the U.S. and an associated easing in global demand and prices for agricultural and mineral commodities. Accompanying this slow-down in the emerging economies has been a correction in emerging-market investments and an adjustment in capital flows away from these emerging markets. Yield-seeking investors are turning back to developed markets where interest rates have started to rise and where prospects for economic growth have brightened.

Brazil has not been alone in this recent multi-year currency depreciation relative to the USD. A common theme across many emerging market currencies, credit booms benefiting domestic expansion dependent on foreign capital inflows, followed by a cyclical slow-down and capital outflow. The Indian rupee (IND) and the Indonesian rupiah (IDR), for example, have fallen 38% and 42% over the same period.

![Figure 4: Recent Correction in Emerging Market Currencies](Source: Pacific Exchange Rate Service)
Looking forward, Brazil's real will continue to feel strong cross-currents over the next year. In the short-term, the real will find support in tightening domestic fiscal policy, a dollar intervention program (dollar buy back) by the BCB and rising interest rates. However, the U.S. Federal Reserve has started to phase-down its quantitative easing program, which is expected to push U.S. interest rates higher and further bolster the USD relative to emerging market currencies. The 2014 Presidential elections in Brazil will also introduce a significant element of political uncertainty that could place additional downward pressure on the real.

Our forecast assumes that the current slide in the BRL will not be protracted and deep, but that the Brazilian economy and the BRL will find support as the U.S. and European economies gain forward momentum. However, these positive factors will be offset by slower growth in China, the mid-East and the developing economies. The BRL, in real terms, is expected to move to a long-term trend forecast of 2.04 by 2018, which although weaker than recent highs will still be considerably stronger than its average over the past two decades.

Source: Pacific Exchange Rate Service, HTRG Research

**Overview of Timber Supply**

Although the majority of Brazil’s land base is native forests, the country’s commercial timber production for the forest product sector and large-scale timberland investment are highly focused on a much smaller area of land committed to plantation forestry. Brazil’s native forests occupy approximately 478 million hectares and represent 60% of total land area of the country, while
plantation forestry is practiced on just 7 million hectares, accounting for less than 1% of Brazil’s total land area (Figure 1). Brazil’s forest plantations produce the majority of the timber needs of the country’s forest product sector, including: 100% of the wood fiber for the Brazilian pulp and paper industry; over two-thirds of the wood for the production of charcoal; 100% of the raw material for softwood lumber; and a high percentage of the timber utilized for commodity plywood and wood panel producers. Use of the country’s tropical hardwoods is concentrated in specialty markets and in residential and industrial fuelwood.

![Figure 1: Land Use in Brazil](image)

Source: Consufor

Sixty percent of Brazil’s native forest resource is tropical hardwood forests located in the northwestern States, with the balance comprised of scattered native temperate forests in the southern region. The majority of planted forests are located in the south and southeastern regions of the country, and are concentrated in the states of Parana, Santa Catarina, Minas Gerais, Rio Grande do Sul and Sao Paulo (Figure 2).
Brazil’s Plantation Timber Resource

Despite the relatively small percentage of planted forests compared to the country’s total forest area, Brazil’s 7.01 million hectares of planted forest resource ranks as number eight in the world for the size of its plantation base, and number one within Latin America. Brazil’s plantations accounted for 53% of the commercial forest plantations within Latin America in 2012. The plantation resource in Brazil is substantially larger than other countries which have attracted institutional investment in high-yield plantation forestry such as New Zealand, Australia, Uruguay and Chile (Figure 3).

Brazil’s rank of eight in the world in terms of plantation acreage understates its contribution to world timber production. The much higher productivity and shorter growing cycles of Brazil’s
plantations allow its total sustainable roundwood production to be of a similar magnitude with regions with more extensive areas of forest plantations. Brazil’s total timber plantation acres (including Eucalyptus and Pine) is 25% of the plantation area in the U.S. South (including only Pine). In 2012, Brazil’s total production of timber from plantations (Eucalyptus and Pine, all end-uses) was estimated at 182 million cubic meters (RISI/ABRAF), which exceeded the total softwood timber production in the U.S. South in the same year, at 158 million cubic meters (RISI) which included some volume produced from non-plantation, natural pine stands.

A large percentage of Brazil's plantation resource is certified by FSC as sustainability managed. The area of plantations (including some native forests) in 2013 was 7.4 million hectares, which was a 70% increase in certified area since 2009. Brazil has 51% of the total FSC certified plantations in all of Latin America, providing manufacturers the necessary assurances to sell their products in diverse international markets.

![Figure 3: Brazil Plantation Area in a Global Context](chart)

Sources: RISI, USDA Forest Service, FAO

The dominant commercial species grown in Brazil is Eucalyptus, representing 70% of plantation area (Figure 4).
Eucalyptus plantations cover 4.87 million hectares, located mainly in the southeast region. Pine plantations cover 1.64 million hectares of Brazil or 23%, and are heavily concentrated in the Southern regions (Parana, Santa Catarina and Rio Grande do Sul). Other hardwoods, Acacia, Teak, Rubber, Parica and Populus account for 7% of the remaining plantation base (Figure 5).
The approximately 4.9 million hectares of Eucalyptus plantations in Brazil have generally been established in support of large pulp and paper or charcoal industries. Though Eucalyptus is native to Australia, few world regions have been more successful than Brazil in the cultivation and utilization of Eucalyptus species. The dominant species grown are Eucalyptus grandis and Eucalyptus urophylla, and assorted clones which can attain growth rates on a seven year rotation as high as 60-70 m³/ha/yr.

![Figure 6: Evolution of Eucalyptus Plantation Establishment](image)

Brazil’s Eucalyptus plantation resource is expected to continue to expand inward from the coast, and northward due to continued expansion of demand from the pulp and paper industry, charcoal industry, and efforts to increase the use of Eucalyptus in the manufacture of solid wood products.

Many of the 1.64 million hectares of Pine plantations in Brazil were established as a result of a government incentive (tax offset) program in operation between 1966 and 1988. This program permitted both individuals and corporations to divert federal taxes toward the establishment of industrial plantations through the creation of afforestation “companies”. The program was successful, yet complex, and has left a legacy of small shareholders with residual legal interests in established plantations.
The end of the Government incentive program in 1988 resulted in a collapse of Pine plantation establishment rates in Brazil until the early 2000s. As a result, the existing resource remains skewed toward older, and generally poorly managed Pine forests. Since 2000, the area of Eucalyptus plantations in Brazil has expanded by 180,000 hectares per year, while the area of Pine plantation area contracted by about 23,000 hectares per year.

Based on the current plantation areas of Pine and Eucalyptus in Brazil today, ABRAF forecasts sustainable production of plantation harvests. The supply of Eucalyptus is forecast to reach over 200 million cubic meters per year in the next decade, a 60% increase from 2012. This outlook accounts for only the plantations already in the ground and assumes no new establishments. Given the current trend in Eucalyptus plantation establishment (Figure 6 and Figure 7), this calculation is a conservative estimate of the available supply of Eucalyptus in the medium term. In contrast, given the skewed age class of the Pine plantation resource, and the reduction in Pine plantings, the Pine plantation supply is unlikely to expand beyond 60 million cubic meters per year, a flat profile from today (Figure 8).
Timberland Ownership

Brazil’s plantation forests are almost exclusively held by private companies and individuals. A number of these companies are either closely held or controlled by family interests. Institutional timber investors have recognized Brazil as a potential source of large forest properties (10,000 hectares and above) for acquisition, and as such, 55% of all the known larger properties owned by institutional timber investors in Latin America are in Brazil. Foreign ownership of plantation forests in Brazil and Latin America as a whole has grown over the past two decades. RISI identifies about 16% of the plantation forest base in Latin America as foreign-owned, and about one-third of the ownership by financial investors and still growing.
The major plantation landowners in Brazil and an estimate of their holdings (in 1,000s of hectares) is listed in Table 1.
### Eucalyptus Plantation Owners in Brazil (4,900,000 hectares)

<table>
<thead>
<tr>
<th>Company</th>
<th>Planted Area (1,000 ha)</th>
<th>Sector</th>
<th>State</th>
<th>% of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fibria</td>
<td>588</td>
<td>Pulp</td>
<td>ES, BA, RS, MS</td>
<td>13.8%</td>
</tr>
<tr>
<td>Suzano Papel E Celulose</td>
<td>177</td>
<td>Pulp</td>
<td>SP, MG, MA</td>
<td>4.2%</td>
</tr>
<tr>
<td>Afubra</td>
<td>161</td>
<td>Agribusiness</td>
<td>RS</td>
<td>3.8%</td>
</tr>
<tr>
<td>Cenibra Celulose Nipo-Brazileria S.A.</td>
<td>147</td>
<td>Pulp</td>
<td>MG</td>
<td>3.5%</td>
</tr>
<tr>
<td>Italmagnesio</td>
<td>119</td>
<td>Steel</td>
<td>MG</td>
<td>2.8%</td>
</tr>
<tr>
<td>Asica</td>
<td>119</td>
<td>Pulp</td>
<td>MG</td>
<td>2.8%</td>
</tr>
<tr>
<td>Vale</td>
<td>113</td>
<td>Steel</td>
<td>PA</td>
<td>2.7%</td>
</tr>
<tr>
<td>V &amp; M Florestal Ltda.</td>
<td>103</td>
<td>Steel</td>
<td>MG</td>
<td>2.4%</td>
</tr>
<tr>
<td>Caf Santa Barbara Ltda.</td>
<td>97</td>
<td>Steel</td>
<td>MG</td>
<td>2.3%</td>
</tr>
<tr>
<td>Veracel Celulose S.A.</td>
<td>91</td>
<td>Pulp</td>
<td>BA</td>
<td>2.1%</td>
</tr>
<tr>
<td>Others</td>
<td>2544</td>
<td></td>
<td></td>
<td>59.7%</td>
</tr>
</tbody>
</table>

### Pine Plantation Owners in Brazil (1,600,000 hectares)

<table>
<thead>
<tr>
<th>Company</th>
<th>Planted Area (1,000 ha)</th>
<th>Sector</th>
<th>State</th>
<th>% of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Klabin</td>
<td>145</td>
<td>Paper</td>
<td>PR, SC</td>
<td>7.8%</td>
</tr>
<tr>
<td>GFP</td>
<td>84</td>
<td>Forestry</td>
<td>PR, SC</td>
<td>4.5%</td>
</tr>
<tr>
<td>Arauco</td>
<td>46</td>
<td>Wooden Panel</td>
<td>PR</td>
<td>2.5%</td>
</tr>
<tr>
<td>Pitangui Florestal</td>
<td>30</td>
<td>Forestry</td>
<td>MG</td>
<td>1.6%</td>
</tr>
<tr>
<td>Rigesa</td>
<td>26</td>
<td>Paper</td>
<td>SC</td>
<td>1.4%</td>
</tr>
<tr>
<td>Berneck</td>
<td>23</td>
<td>Wooden Panel</td>
<td>PR</td>
<td>1.2%</td>
</tr>
<tr>
<td>Comfloresta</td>
<td>23</td>
<td>Forestry</td>
<td>SC</td>
<td>1.2%</td>
</tr>
<tr>
<td>Irani</td>
<td>22</td>
<td>Paper</td>
<td>SC, RS</td>
<td>1.2%</td>
</tr>
<tr>
<td>Gerdau Florestal</td>
<td>20</td>
<td>Forestry</td>
<td>SC</td>
<td>1.1%</td>
</tr>
<tr>
<td>Adami</td>
<td>18</td>
<td>Lumber</td>
<td>SC</td>
<td>1.0%</td>
</tr>
<tr>
<td>Others</td>
<td>1431</td>
<td></td>
<td></td>
<td>76.6%</td>
</tr>
</tbody>
</table>

Source: Consufor
Timber Demand

Industrial Roundwood Production Trends

Growth in Brazil’s industrial roundwood production accelerated in the 2000s, increasing from 100 million cubic meters in 1999 to 146 million cubic meters in 2012 (Figure 1). This ramp up in production was almost all hardwood, and reflected substantial investment in the country’s Eucalyptus plantation resource and pulp and paper facilities. Brazil’s production of hardwood industrial roundwood increased from an average of 61 million cubic meters per year in 1998-2002 to 105 million in 2012. The growth in hardwood timber production, particularly in the 2000s, relied upon commercially managed Eucalyptus plantations, which allowed the hardwood share of Brazil’s total industrial roundwood production to increase from an average of 59% in 1991-1995 to 71% in 2012. Brazilian industrial roundwood production was only mildly impacted by the Global Financial Crisis in 2008, and then continued to expand, reaching a new peak of 146 million cubic meters per year in 2012.

![Figure 1: Industrial Roundwood Production](image)

Source: FAO

The management of Brazil’s hardwood (non-coniferous) resource has steadily moved towards production of short-rotation pulpwood. In 2012, pulpwood accounted for 61% of Brazil’s non-coniferous industrial roundwood production up from 50% in 2000, and hardwood share of total pulpwood production has trended up from 65% in 1995 to 87% in 2012. The expanding high-yield Eucalyptus plantation resource in Brazil has been a key building block for growth in the country’s
pulp, paper industries. Concurrently, greater restrictions have been placed on harvesting native forests for the production of hardwood sawlogs.

Softwood industrial roundwood production in Brazil experienced only modest growth in the 1990s and 2000s, increasing from 31 million cubic meters in 1990 to 42 million in 2012. The management of Brazil’s softwood resource has been focused on the production of sawlogs, with sawlogs representing an average 71% of softwood industrial roundwood production in the period 2000-2012 (Figure 3). Softwood sawlog production was only moderately impacted by the global financial crisis (GFC), and was able to recover to close to the previous peak production, based on demand generated by the strength of the domestic economy.
In Brazil, softwood pulpwood is generally produced as a secondary product from Pine plantations, which are managed for sawlogs as the primary objective. Pulpwood is generated through thinning operations and the capture of smaller and lower quality logs and tops in the final harvest. The Other category of softwood industrial roundwood production covers minor products, such as poles, pilings and rail-ties, and accounts for approximately 5% of Brazil’s total industrial softwood roundwood production.

**Pulpwood Demand**

Pulpwood consumption as defined by FAO does not include commercial fuelwood, and included in this report under the later section on energy wood. In Brazil, demand for pulpwood is driven by two principal markets, pulp and charcoal (Figure 4), and reconstituted wood panels make a more secondary contribution to total pulpwood demand. Through 2005, charcoal production in Brazil was nearly of the same magnitude as pulp production. In the second half of the decade and onward, pulp production continued to expand while charcoal production slipped, leaving the pulp industry as the major driver of Brazilian pulpwood demand. Demand at pulp mills accounts for roughly 65% of pulpwood consumption (Figure 4).
Charcoal

Although growth in Brazilian charcoal production has been lackluster in recent years, charcoal production remains a major source of demand for Eucalyptus pulpwood. With 88% of Brazil’s total charcoal production consumed by the domestic iron and steel industry (Figure 5), future trends in Brazil’s charcoal production will be directly linked to developments in the Brazilian iron and steel sector.
Brazilian steel production grew at a moderate rate over the two decades leading up to the GFC, increasing from 20.6 million tonnes in 1990 to 33.8 million tonnes in 2008. Over this same period, charcoal production trended higher with steel production (Figure 6.). With the onset of the GFC both steel and charcoal production declined. In 2009, steel production dropped 21%, while charcoal production dropped a much deeper 40%. The more pronounced drop in charcoal production reflected the fact that charcoal is used in the production of pig iron which is used by the domestic steel industry and is also exported as raw material to foreign steel makers. Only about 10% of Brazilian crude steel production uses charcoal instead of coking coal. Exports were a particularly important market for those non-integrated pig iron producers in Brazil, who also tended to have operations using charcoal.

By 2011, Brazilian steel production had recovered and reached a new peak of 35.1 million tonnes, while charcoal production made only modest gains in the years after the GFC. In 2012, Brazilian charcoal production was still 17% below its 2007 level, reflecting a lackluster recovery in pig iron exports.

The major destination for Brazil’s pig iron exports has been the U.S., and this market has been shrinking since the mid-2000s. U.S. imports of pig iron trended lower from a high of 6.7 million tonnes in 2006, to an average of 4.0 million tonnes per year in 2010-2012 (Figure 7). A revival in U.S. demand for imported pig iron remains questionable. Lower prices for natural gas in the U.S. have boosted the cost competitiveness of U.S. domestic integrated steel mills and have reduced the economic rationale for using imported pig iron as a lower cost substitute for domestic crude steel.
Brazilian charcoal demand will also face challenges in domestic markets as Brazilian steel producers confront stiff competition in an over-supplied global market. The huge expansion in global steel capacity that occurred in the 2000s, particularly in China, will impact the steel sector for years. Between 2000 and 2012, China’s steel production increased at an explosive rate, rising from 128 million tonnes to 709 million tonnes in 2012. China is now the number one producer of steel in the world, accounting for 46% of total global production. China consumes the vast majority of its production domestically, but in 2011 was still able to register net exports of 32 million tonnes of steel.

The current slow-down in China’s economic growth rate and the potential diversion of more Chinese steel into offshore markets will continue to be a source of pressure on Brazil’s steel industry. In the medium to longer term, Brazil’s steel industry should continue to expand based on the overall growth of the domestic economy, the country’s abundant iron resources and its relatively low labor and power costs. However, growth in Brazil’s steel industry will not necessarily translate into a corresponding increase in charcoal demand as the country’s steel production becomes increasingly focused on higher quality products utilizing coke instead of charcoal.

For suppliers of plantation grown eucalyptus to the charcoal industry, the outlook is a bit brighter. The impacts of the less than optimistic outlook for Brazilian charcoal production should be mitigated by the continued shift away from the use of wood from native forests and increased sourcing from sustainably certified plantations. Pöyry reported that in 2011, 69% of the raw material used to produce charcoal in Brazil was sourced from planted forests, indicating room for a further shift toward the utilization of plantations sourced wood fiber by Brazil’s charcoal producers.
Pulp, Paper and Paperboard Markets

Brazilian pulp production has experienced strong sustained growth over the past three decades, increasing from 3.4 million tonnes in 1980 to 14.4 million tonnes in 2012. The primary driver of Brazilian pulp production has been expanding exports of market pulp. Exports as a share of total pulp production have increased from an average 27% in the 1980s to 59% in 2011-2012 (Figure 8).

The principal destinations for Brazil’s market pulp exports in the 2000s were the U.S. and China, followed by Europe. In the period 2002 to 2011, the U.S. accounted for an average of 22% of pulp exports from Brazil, China represented 21%, while together France, Germany, Italy and Belgium took 26%. The remaining 31% of Brazil’s pulp exports went to a diverse mix of destinations.

Brazil’s pulp exports increased dramatically during the 2000s, rising from 3.0 million tonnes in 2000 to a peak of 8.9 million tonnes in 2011, reflecting the expansion during the period in new pulp capacity (Figure 10). Brazil’s position in highly competitive global pulp markets benefited from the low cost position of its new, large scale, efficient pulp mills, low input costs (labor, wood and energy) and a favorable exchange rate. Following the GFC, the cost advantage of Brazil’s pulp sector eroded due to a significant appreciation in the Brazilian real. In addition to the drag associated with the stronger Real, Brazil’s pulp exports have also faced sluggish growth in key markets, such as the U.S. and Europe, and have become more dependent on China.
Figure 9: Brazil Wood Pulp Exports by Destination – Average Market Share 2002-2011
(Average Annual Export Volume = 5.8 million tonnes)

Figure 10: Pulp Exports by Destination

Major European = Belgium, France, Germany and Italy

Source: FAO
Moving forward, Brazil’s pulp industry will be challenged to replicate the growth in markets experienced in the 2000s. Prospects in Europe will be constrained by the extended economic downturn that will continue to negatively impact the region in the coming decade, while the growth in demand for market pulp in China will be moderated by a combination of the country’s significant expansion of its own domestic pulp capacity and a moderation in China’s overall rate of economic growth.

Domestic consumption of pulp in Brazil maintained a moderate upward trend over the past three decades, as Brazil’s paper and paperboard industry expanded (Figure 11). Between 1980 and 2012, domestic consumption of pulp in Brazil more than doubled, increasing from 2.5 million cubic meters to 5.9 million. Over this same period, Brazil paper and paperboard production expanded at a more robust pace, rising from 3.4 to 10.2 million tonnes, utilizing a steadily increasing proportion of recovered paper as a source of fiber.

![Figure 11: Source of Fiber for Domestic Paper & Paperboard Production](source)

Source: FAO

Brazil’s production of paper and paperboard is nearly all targeted at domestic markets, with trade a minor factor (Figure 12). The products that have made the biggest contributions to the growth in Brazil’s paper and paperboard sector have been packaging and tissue, while demand for newsprint and printing and writing paper experienced modest growth (Figure 13). In 2012, packaging papers and paperboard products accounted for 58% of Brazil’s total paper and paperboard production. Demand for both paper packaging and for tissue products (diapers, household and hygiene) should continue to grow in Brazil in the coming decade, fueled by growth in the population and the overall economy and rising per capita income. On the other hand, graphic paper (newsprint and printing and writing papers) demand is not expected to even maintain the modest pace of growth.
experienced over the past decade, and will increasingly be confronting downward pressure from an expanded use of electronic media.

Figure 12: Paper and Paperboard – Consumption and Trade

Source: FAO

Figure 13: Paper and Paperboard Production by Grade

Source: FAO
Chip Exports

Wood chip exports are a relatively small component of Brazil’s pulpwood economy, totaling 1.0 million bone dry tonnes in 2013, which is approximately 7% of the wood fiber consumed by Brazil’s pulp mills. Brazilian woodchip exports were initiated in 1992, with exports of Caribbean Pine chips from AMCEL. As the pine plantations were harvested, they were replaced with Eucalyptus, and in recent years almost all of the chip exports are eucalyptus (Figure 14) and some acacia from Rio Grande do Sul. Brazil’s woodchip exports peaked in 2004 at 1.2 million bone dry tonnes and then trended lower, and in the period 2009-2013 have averaged 0.9 million bone dry tonnes per year.

Energy Wood Markets

More wood fiber is consumed as industrial fuelwood to produce heat and steam in Brazil’s industrial sectors (Table 1), than is used in the production of charcoal (Figure 15). The Brazilian Association of Forest Plantation Producers (ABRAF) estimates that in 2012 industrial fuelwood demand from just Eucalyptus plantations was 37 million cubic meters (a significantly higher volume than the estimate by EP Energy Corp (EPE) for all sources including native forests and residues presented in Table 1.) Although the precise volume of industrial fuelwood demand is subject to debate, the ABRAF data clearly highlights industrial fuelwood as a major end-use of a similar magnitude with pulp and charcoal. The EPE industrial fuelwood data documents the robust growth in fuelwood consumption in a number of important sectors such as agriculture, food processing and ceramics.
Looking forward, a number of factors will continue to support further expansion in the use of plantation grown Eucalyptus for industrial fuelwood. Fuelwood is the principal energy source for drying and processing grains and soya, and Brazil’s export oriented soya harvest has increased dramatically over the past decade, rising from 38 million tonnes in 2000 to a peak harvest of 75 million tonnes in 2011 (Conab). Soya production is projected to continue to trend higher, possibly reaching 100 million tonnes within the next ten years. Environmental groups are pressuring the major multi-national grain traders such as Cargill, Bunge and others to reduce the use of fuelwood from native forests by boosting their sourcing from sustainably managed plantations.

With hydropower representing 76% of Brazil’s domestic final energy consumption, the prospects for developing large commercial woody biomass power generation are limited. However, Brazil does
have the potential, based on the high productivity of its Eucalyptus plantations, to become a major supplier of wood pellets for European power plants. In 2013, the U.S. exported an estimated 2.5 million tons of wood pellets to Europe, while total wood pellet production in Brazil was under 0.1 million tons and almost entirely geared to the domestic market. Brazil’s current wood pellet mills are small and scattered with the largest (ECO-x Pellets) having a capacity of 37,500 tonnes. To gain a foothold in the European market would require investment in large, cost competitive facilities that were logistically located relative to forest plantations and port facilities. Suzano had proposed a 3.0 million tonne per year export pellet mill to be located in northeast Brazil, but the project was dropped in 2013. The Colleman Group has announced a 1.0 million tonne per year plant in Santa Catarina, with start-up scheduled for June 2014.

Lumber and Wood Panel Markets

Domestic lumber and plywood mills provide the overwhelming market for Brazil’s softwood sawlog harvest, with only minimal volumes of unprocessed sawlogs being exported. Over the period 2000 to 2012, FAO reported that exports of unprocessed logs averaged less than 0.1% of Brazil’s annual harvest of industrial roundwood. Brazil’s sawlog harvest has trended higher at a moderate rate, increasing from 38 million cubic meters in 1990 to 55 million in 2011 (Figure 16), supported by growth in both lumber and plywood/veneer production. Lumber is the dominant end-use market for Brazilian sawlogs. In the period 2008-2012, total lumber production in Brazil averaged 25 million cubic meters per year compared to an average of just 3 million cubic meters of plywood.

Lumber

The majority of the growth in the Brazilian lumber sector since the 1990s has been tied to expanded production of softwood lumber. The species mix of Brazilian lumber production has shifted from 80% hardwood in 1990 to 63% in 2012. The lumber production figures reported by FAO show no impact on Brazil’s lumber industry from the GFC, but Brazilian lumber production statistics are probably better employed as an indicator of general trends, given the highly fragmented nature of the industry, particularly in the case of the hardwood sawmills. Brazil’s plywood industry is more concentrated and the reported production statistics are probably more accurate than for either lumber or sawlogs. Brazilian plywood and veneer production peaked in 2004 at 4.4 million cubic meters and has since trended lower, reaching 3.0 million cubic meters in 2012.
Brazil’s softwood lumber industry expanded in the 1990s and the first half of the 2000s, as production rose from 2.8 million cubic meters in 1990 to a cyclical peak of 9.6 in 2007 (Figure 17). Brazilian softwood lumber production was negatively impacted by the GFC and slipped 12% between 2007 and 2009, dropping to 8.5 million cubic meters. Production has since recovered, but in 2012 was still 4% below the 2007 peak volume. A key factor in the GFC induced set-back in softwood lumber production was a sharp contraction in exports, which declined 44%, from 1.5 million cubic meters to 0.8 million cubic meters, between 2007 and 2009.

Exports are an important component of the total demand for Brazil’s softwood lumber, accounting for 14% of total production in the period 2002-2011. The U.S. has been the number one destination for Brazil’s softwood lumber exports, representing the bulk (45%) of the past decades shipments (Figure 18). The collapse in U.S. housing markets that coincided with the GFC and the subsequent delayed and measured recovery in U.S. residential construction weighed heavily on Brazil’s exports of softwood lumber. In 2012, Brazil’s softwood lumber exports were still extremely weak at 0.7 million cubic meters, the lowest volume since 1997. A significant acceleration in U.S. residential construction activity will be necessary to re-energize Brazil’s softwood lumber exports.
Since 1990, Brazil’s domestic demand for softwood lumber maintained a robust upward trend, increasing from 2.7 million cubic meters in 1990 to 8.4 million in 2012. In contrast to the deep GFC related reversal in the export market for softwood lumber, domestic demand was only modestly impacted in 2008-2009 and subsequently recovered, setting new production highs. Demand domestically for softwood lumber has trended higher with growth in the overall economy as measured by GDP in inflation adjusted BRL as illustrated in Figure 19. Softwood lumber is used
extensively in construction applications (residential, commercial and infrastructure) as well as end-uses such as packaging, furniture, cabinetry and industrial uses highlighting the close connection between overall economic activity and domestic softwood lumber consumption.

Given the potential for significant growth in Brazil’s economy over the medium and longer term, the outlook for further increases in Brazil’s domestic demand for softwood lumber is quite positive. Based on Brazil’s demographics, the ongoing trend of urbanization coupled with the need for improved housing and infrastructure, construction activity will continue to be a key element in Brazil’s ongoing economic growth. In the short-term, Brazilian construction markets will be facing some potential headwinds that could result in a loss of momentum or possibly a reversal in construction activity over the next couple of years (weaker economy, possible political change, deteriorating credit environment and a possible housing bubble).

**Plywood**

Driven by exports, Brazil’s plywood and veneer sector experienced major investment and growth from the mid-1990s to the mid-2000s. Brazilian plywood and veneer production increased from 1.9 million cubic meters in 1995 to 4.3 million cubic meters in 2005. Over this period, domestic consumption remained relatively flat, while plywood and veneer exports grew from 0.8 million cubic meters to a peak of 3.9 million meters. By the middle of the 2000s, Brazil’s plywood exports represented over 80% of total production (Figure 20).
In the wake of the GFC, Brazilian plywood and veneer exports went into a protracted decline, falling to 1.4 million cubic meters in 2012, a 64% retrenchment from the 2005 peak. The ongoing decline reflected the deterioration in market conditions in the principal destinations for Brazil’s plywood exports, the U.S., U.K. and Western Europe, all of which experienced deep, protracted recessions and collapsed housing markets. Brazil’s plywood industry was able to partially compensate for the declines in export activity since 2005, by focusing on rebuilding domestic markets and more aggressively competing with alternative products. Even with improved domestic demand, Brazilian plywood and veneer production had slipped to 3.0 million cubic meters in 2012, 30% below the 2004 peak.
Reconstituted Wood Panel Markets

Brazil’s reconstituted wood panel sector as reported by FAO encompasses the following product categories; hardboard, insulating board, medium density fiberboard (MDF) and particleboard. The two most important product categories are MDF and particleboard. The particleboard category includes Oriented Strand Board (OSB), and the MDF category includes compressed fiberboard. Reconstituted wood panel production maintained a strong upward trend from the mid-1990s through 2012, barely slowing down during the GFC. Brazil’s total output of reconstituted wood panels increased from 1.4 million cubic meters in 1990 to a peak of 7.4 million cubic meters in 2012 (Figure 22). MDF began to be produced in Brazil in 1998, and expanding investment in Brazilian MDF capacity has driven the overall growth of Brazil’s reconstituted wood panel sector over the past fifteen years. MDF’s share of total reconstituted wood panel production has grown from 0% in 1997 to 50% in 2012.

Brazil’s reconstituted wood panel industry is overwhelmingly focused on domestic markets with exports only contributing a small portion of total demand (Figure 23). Over the past decade, domestic demand accounted for 96% of Brazil’s total production of reconstituted wood panels. Although Brazil’s total production of reconstituted panels at 7.4 million cubic meters in 2012 was substantially larger than the production of plywood and veneer (3.0 million cubic meters), the impacts of the reconstituted wood panel industry on timber demand and timber values are more diffuse. Whereas the raw material needs of the plywood industry are sharply focused on higher quality, higher value sawlogs, the fiber needs of the various reconstituted wood panels are much more flexible and more geared to lower cost types of wood fiber. Particleboard, hardboard and
insulation board generally utilize manufacturing residuals from the production of lumber and plywood as their principal source of wood fiber. MDF draws upon a mix of manufacturing residuals and roundwood pulpwood. Due to the need to control the size and shape of the wood fibers used to produce OSB, roundwood pulpwood is required as the raw material.

**Forest Product Sector**

**Industry Structure – First Tier Forest Product Companies**

The four largest Brazilian forest product companies are producers of hardwood market pulp (Fibria Celulose and Eldorado Celulose e Papel), a mix of pulp and paper products (Suzano Papel e Celulose) and paperboard and packaging (Klabin). Fibria is the largest by sales of the first tier pulp and paper companies (Table 1), with 2012 total sales of $3.1 billion, 24% larger than Suzano and 47% greater than Klabin. Since Eldorado only commenced operations at its first mill in 2013, a comparison of 2012 sales data is not relevant. All three companies have extensive international sales and distribution systems, but their manufacturing facilities are all located in Brazil, where: Fibria operates 4 pulp mills; Suzano, 6 mills; Klabin 7 mills; and Eldorado, a single facility.

In addition to Fibria, Suzano and Eldorado, two other firms operate bleached hardwood kraft market pulp operations in Brazil: Veracel, a joint venture between Fibria and Stora Ensa, with each holding 50% ownership; and, CMPC, a major Chilean forest product company. Veracel operates a single hardwood market pulp mill in the state of Bahia and has 118,000 Ha of eucalyptus plantations.

Source: FAO
supporting the operation. The Veracel mill has an annual capacity of 1.2 million tonnes and has been in operation since 2005.

CMPC purchased a pulp and paper mill in Brazil in 2009 from Aracruz (Aracruz merged with Votorantim Celulose e Papel (VCP) in 2009 to form Fibria). CMPC’s Guaiba mill in the state of Rio Grande del Sul produces 0.395 million tonnes of bleach Eucalyptus kraft market pulp and 0.055 million tonnes of printing and writing paper for the Brazilian market, and is supported by 210 hectares of forestland, of which 60% is planted in Eucalyptus.

<table>
<thead>
<tr>
<th>Table 1: Brazil’s First Tier Forest Product Companies: Comparison of 2012 Financial Indicators</th>
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<tr>
<td>Fibria Celulose</td>
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<tr>
<td>Sales (million US$)</td>
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<tr>
<td>Market Cap (million US$)</td>
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<tr>
<td>S&amp;P’s Credit Rating</td>
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<tr>
<td>EBITDA Margin</td>
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Source: HTRG Research

Klabin’s bond rating of BBB- (low-end of the lower-medium grade category) was the strongest credit rating of the three companies reporting 2012 financial results. Both Fibria and Suzano’s credit rating fell into the non-investment grade speculative category, with Fibria receiving a slightly higher ranking than Suzano (Table 1). Of the three companies, Suzano’s market valuation relative to sales is substantially less than both Fibria and Klabin, possibly reflecting the company’s higher debt to EBITDA position. All three companies in the past year have focused on sales of non-core assets (including timberlands) to pay down debt, and position themselves for future investment in expanded production.

Of the four top tier companies, two, Fibria and Eldorado are exclusively focused on the production of a single product, bleached hardwood kraft pulp. Fibria is the number one producer of market pulp, and Eldorado’s new mill is the largest single-line production market pulp mill in the world. Suzano is also a major pulp producer (the second largest producer of hardwood kraft market pulp in the world), but it also produces a variety of printing and writing and packaging grades (Figure 1). Klabin is focused on packaging grades of paper and paperboard and produces a small volume of
non-integrated pulp (Figure 2), and is the largest producer of linerboard, cartonboard, industrial bags and corrugated boxes in Brazil.

Source: RISI
Figure 3: Estimated Global Pulp Production, 2013

Pulp
169 million tonnes

Mechanical
31 million tonnes

Chemical
138 million tonnes

Integrated Mills
85 million tonnes

49% 51%

Market Pulp
53 million tonnes

Softwood/Other
26 million tonnes

33% 67%

Hardwood
27 million tonnes

Acacia/Other
9 million tonnes

50% 50%

Eucalyptus
18 million tonnes

Other Eucalyptus
10 million tonnes

BRAZIL
9 million tonnes

Source: Fibra Corporate Presentation January 2014 page
Bleached hardwood Kraft market pulp is the most important product line for each of Fibria, Suzano and Eldorado, and their combined production places Brazil in the preeminent position in global hardwood market pulp markets. Brazil accounts for approximately one-third of global production of hardwood market pulp and roughly half of world production of Eucalyptus market pulp (Figure 3). The scale of the Brazilian pulp companies is world class, with all three Brazilian companies and CMPC in the top 20 market pulp producers ranked by capacity (Figure 4), and with Fibria occupying the top position.

All of the major Brazilian pulp producers have operations that are integrated back to their own plantations. The plantation ownership of the companies are: Fibria, 509,000 hectares; Suzano, 400,000; Klabin, 237,000; and Eldorado, 160,000.
In recent years, all four of the Brazilian companies and CMPC have been actively investing in expanded bleached Eucalyptus kraft pulp capacity in Brazil and have additional mills planned or in development.

- Fibria’s newest mill, Três Lagoas, began operations in 2009 with an annual operating capacity of 1.3 million tonnes, and the company has plans to add a second line at Três Lagoas. In January 2014, Fibria announced that it was continuing with feasibility studies for the second pulp line and recently met with 36 equipment suppliers to participate in the detailing stage of the project. The new project has already received environmental licensing and should be submitted for Board approval by the end of the first half of 2014. The new pulp line will have a capacity of 1.75 million tonnes and would be scheduled for start-up at the end of the fourth quarter of 2016.

- Eldorado started operations at their Três Lagoas mill at the end of 2012. The mill was originally targeted to produce 1.5 million tonnes per year, and the company is aiming to expand the No. 1 pulp line to 1.7 million tonnes. Eldorado has moved forward on plans for a 2.3 million tonnes per year second pulp line at Três Lagoas that is scheduled to start operation in 2017.

- In December 2013, Suzano announced the start-up of their 1.5 million tonne per year Maranhão mill, which will be ramping up production in 2014.

- Klabin is in the process of building a 1.5 million tonne per year (1.1 million tonnes hardwood and 0.4 million tonnes softwood) pulp mill in the state of Parana. In October 2013, Klabin announced that 40% of the earthwork for the facility was complete, and the projected time of completion is Q2:2016.

- CMPC is currently adding a second pulp line to the Guaiba hardwood pulp mill that they acquired from Aracruz in 2009. The planned capacity of the new pulp line is 1.3 million tonnes per year, and the mill is targeted to begin operations in Q2:2015.

Timber Prices

Eucalyptus Pulpwood

Since the early 2000s, Eucalyptus pulpwood prices in Brazil have been highly reflective of the market trends for Eucalyptus market pulp (Figure 1). Eucalyptus market pulp is traded globally and is denominated on a U.S. dollar (USD) basis. In the 2000s, Eucalyptus market pulp prices rose from USD $610 per tonne in 2001:Q1 to a peak of $917 per tonne in 2011:2Q, an increase of 50%. Over the same period, Brazilian Eucalyptus delivered prices as reported by STCP Engineering, rose from USD $9.14 per tonne to US$ 28.40 per tonne, a 210% increase. The upward trajectory of Eucalyptus market pulp prices built on the solid growth in global demand for the specific paper grades (tissue
and hygiene) in which Eucalyptus pulp had established clear performance advantages. In the 2000s, tissue markets grew in both mature developed markets such as the U.S. and Europe as well as in emerging economies. Adding further fuel to the rise in Eucalyptus market pulp prices was the dramatic growth of China's imports of market pulp over the past decade. Brazil responded to the rising demand and prices for Eucalyptus pulp with significant expansions in world class pulp capacity geared for export markets. Between 2001 and 2011, Brazilian pulp production nearly doubled, rising from 7.4 million tonnes to 14.3 million, while the export share rose from 41% to 60% over the same period.

Prior to the explosive expansion of Brazilian pulp capacity in the 2000s, the major consumers of Eucalyptus pulpwood in the pulp and charcoal/steel sectors generally owned and managed their own plantations and were relatively self-sufficient. Consequently, the volume of commercial trade in eucalyptus pulpwood was small. Even with the massive expansion of the Eucalyptus market over the past decade, only about 20 – 30 % of eucalyptus pulplogs are currently purchased on the open market. Prices for Eucalyptus pulpwood prior to 2003 were reported as being relatively flat, reflecting adequate supplies of Eucalyptus for the in-place capacity. Eucalyptus pulpwood prices prior to 2003 were moderated by favorable supply conditions. In the second-half of the 1990s, Brazil’s supply of Eucalyptus pulpwood was boosted by the expansion in the plantation resource that resulted from the government financial incentive programs of the 1980s that were implemented.
to encourage plantation establishment. The Eucalyptus pulpwood price appreciation of the 2000s was strongly supported by the combination of surging investment in new pulp mill capacity as well as the loss of government financial incentives for plantation establishment.

A key rationale driving the massive investment in Brazil’s export-oriented Eucalyptus market pulp industry in the past decade was Brazil’s position as a low cost producer. However, the robust gains in Eucalyptus pulpwood prices between 2003 and 2011, accompanied by a similarly strong appreciation in the Brazilian currency has eroded Brazil’s competitive edge. A comparison between Brazilian Eucalyptus pulpwood prices and mixed hardwood pulpwood prices in the U.S. South illustrates the loss of one of Brazil’s key competitive advantages over the course of the 2000s (Figure 2).

Since mid-2011, Brazilian Eucalyptus pulpwood prices have made a significant downward correction, slipping from USD $23 to USD $15 in the third quarter of 2013. The recent weakness in Brazilian pulpwood prices reflects the sagging domestic economy, negative impacts of slower growth in the key China export market and a major depreciation in the Brazilian real.

![Figure 2: Inflation-adjusted Brazilian Eucalyptus and U.S. South Mixed Hardwood Delivered Pulpwood Prices](image)

Between now and the end of the decade, Eucalyptus pulpwood prices in Brazil will find new support from the next round of scheduled major pulp mill start-ups, which are expected to add 13.3 million tonnes of new capacity in the next four years. However, the strength of pricing will most likely be region specific. Eucalyptus log prices in regions with established pulp and paper industries (Minas Gerais and Sao Paulo) that have achieved a balance between Eucalyptus demand and supply will feel more limited upward price pressure. Pulpwood prices in regions in which eucalyptus demand is
dominated by charcoal production will be challenged by lackluster iron and steel demand and softer global commodity markets. Price appreciation will be focused on those regions of Brazil where Eucalyptus pulp capacity will expand and where producers have a greater dependency on timber supplies outside of their direct ownership or control.

**Eucalyptus Sawlogs**

A solid wood products market based on plantation grown eucalyptus developed in Brazil in the 1990s for the production of lumber and veneer, but the scale of the market for eucalyptus saw logs is considerably smaller and less developed than that of the pine saw log market. Stumpage prices trends for eucalyptus sawlogs have followed pulpwood markets quite closely, with sawlogs holding a fairly consistent premium between 40-45% over pulpwood. The price correlation between the rate of change in inflation-adjusted eucalyptus pulpwood prices and that of Eucalyptus sawtimber over the period March 1997 through September 2013 is strong at 0.89. The premium on Eucalyptus sawlogs over pulpwood reflects the higher costs associated with its production (longer rotation age) and the higher values associated with the end-product (lumber and veneer versus pulp).

Over time, Eucalyptus lumber, plywood and veneer have gained wider acceptance as substitutes for native hardwood species, and should benefit in the future as public opinion continues to favor reducing the harvesting of Brazil’s native tropical forests.

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**Figure 3 : Inflation Adjusted Eucalyptus Delivered Log Prices in Brazil**

STCP Engineering
Pine Sawlogs

Brazil’s managed Pine plantation are primarily located in the southern regions of Parana, Rio Grande do Sul, and Santa Catarina, with these states representing over 75% of Brazil’s Pine plantation area. Figure 4 displays the quarterly inflation-adjusted prices for plantation Pine logs in these regions of Brazil from 1995 to 2013, in both USD and BRL. End-use markets for Brazilian Pine sawlogs are predominantly domestic, but exports of both softwood lumber and plywood became increasingly important in the first half of the 2000s, particularly in the case of plywood.

In the second half of the 1990s, rising demand from Brazil’s expanding lumber and plywood production, primarily targeted at domestic markets, allowed inflation-adjusted Pine sawlog prices in local currency to steadily trend higher. During this period, a depreciating BRL relative to the USD, allowed Brazilian Pine sawlog prices to trend lower in US dollars, improving the competitive cost position of Brazilian sawmills and plywood plants in the U.S. market. In the first half of the 2000s, the combination of continuing strong growth in domestic consumption of softwood lumber and surging export demand tied to the U.S. housing boom resulted in major increases in the inflation adjusted price of Pine sawlogs in both domestic and U.S. currencies. From 2002 to 2005, inflation-adjusted Pine log prices increased 70% in BRL and 150% in real USD terms.

Figure 4: Inflation-Adjusted Delivered Pine Sawlog Prices in Brazil

Source: STCP Engineering
In 2007, Brazil’s domestic lumber consumption peaked and lumber exports had already started to decline as the U.S. housing market slowed. With the onset of the GFC and the collapse in U.S. residential construction, Brazil’s exports of both softwood lumber and plywood fell sharply; resulting in a deep correction in Pine sawlog prices, bringing BRL dominated prices back to the levels of 2002. In local currency, Brazilian Pine sawlog prices have continued to drift lower since 2009, reflecting relatively flat domestic and export demand for solid wood products. A strong revival in export demand was curtailed following the GFC by the still weak housing market in the U.S. and the appreciation of the BRL relative to the USD.

Over the next few years, Brazilian Pine sawlog prices will benefit from a number of factors. The government will be supporting a major infrastructure construction initiative, along with construction associated with hosting the World Cup in 2014 and the Summer Olympics in 2016. In addition, the ongoing depreciation of the BRL versus the USD since 2011 has restored some of the competitiveness of Brazilian lumber and plywood and could allow Brazil to rebuild their market presence in the recovering U.S. wood products markets.