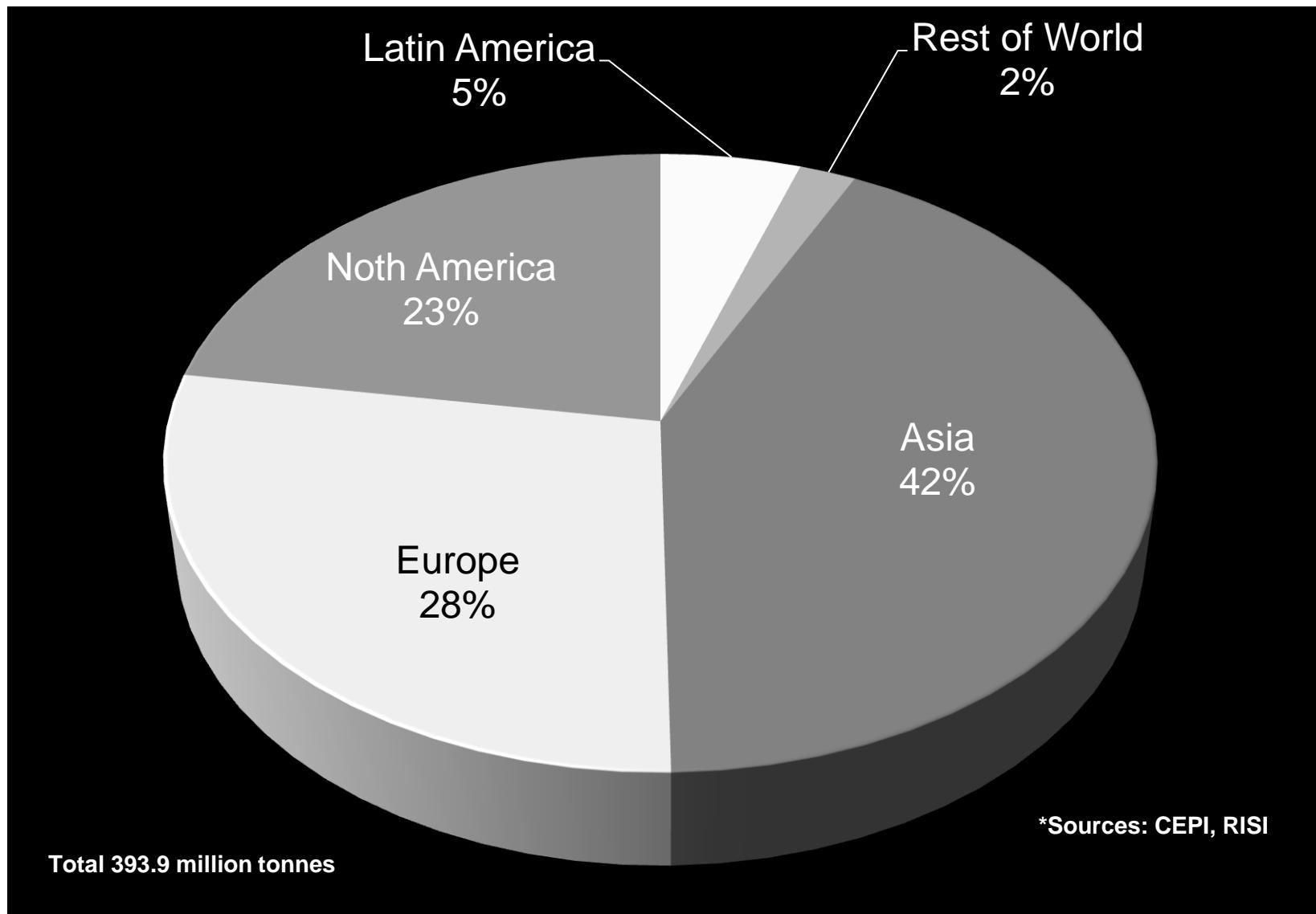




Water Use and Reuse in an Integrated Paper Mill

Carson Barry – NewPage Corporation

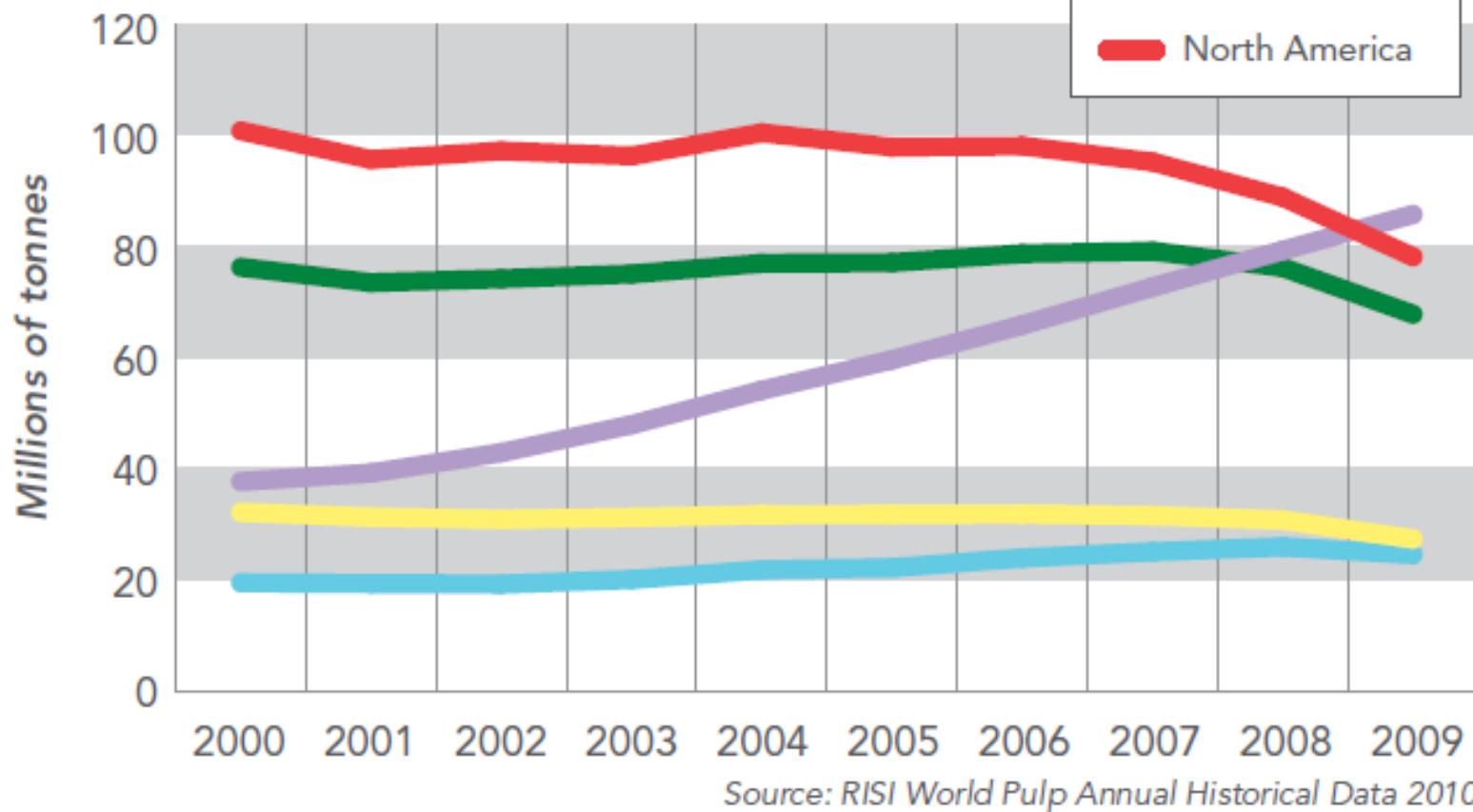
2011 Board and Paper Production by Region*



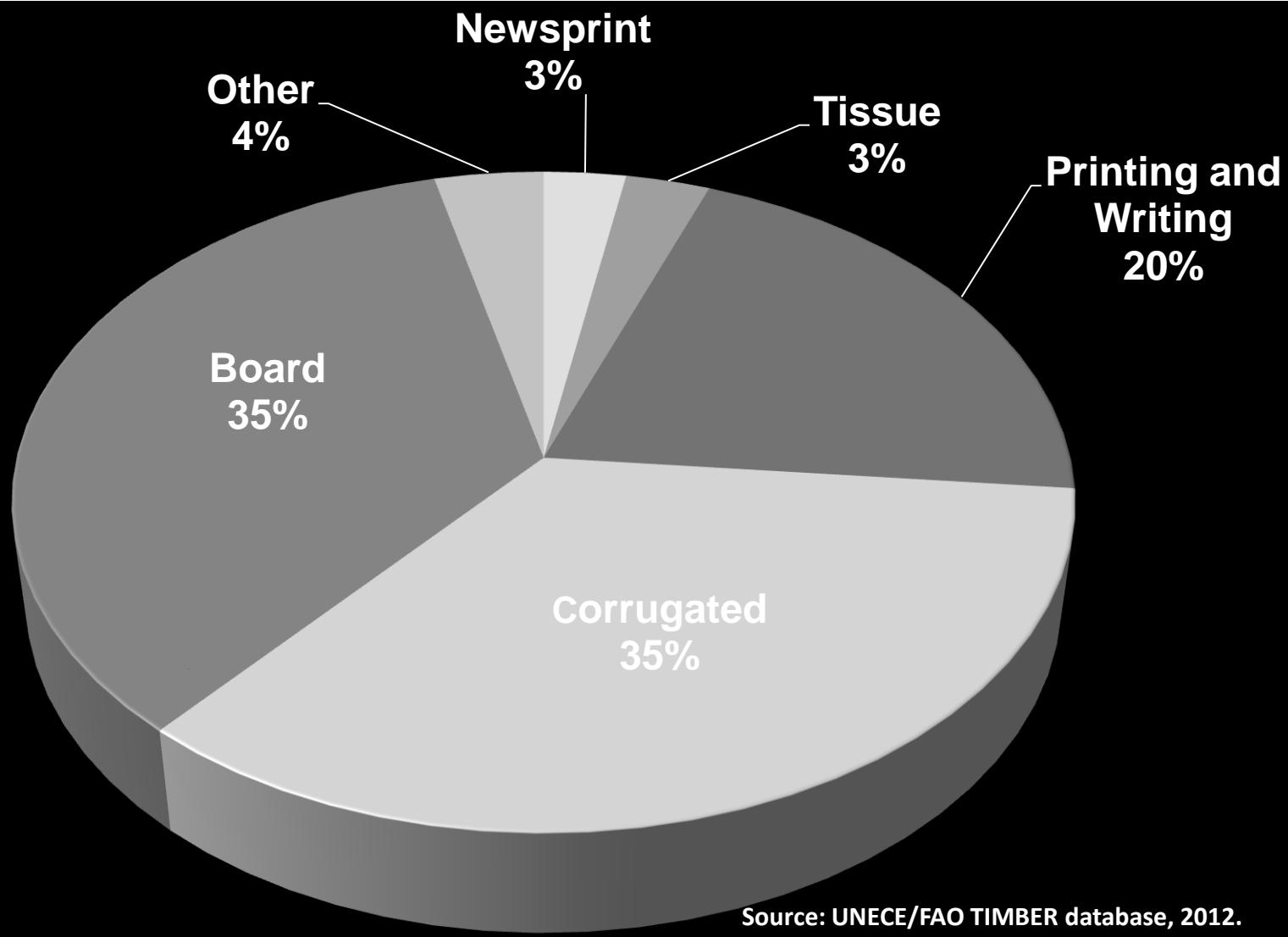
Global Paper Consumption Trends

<http://environmentalpaper.org/documents/state-of-the-paper-industry-2011-full.pdf>

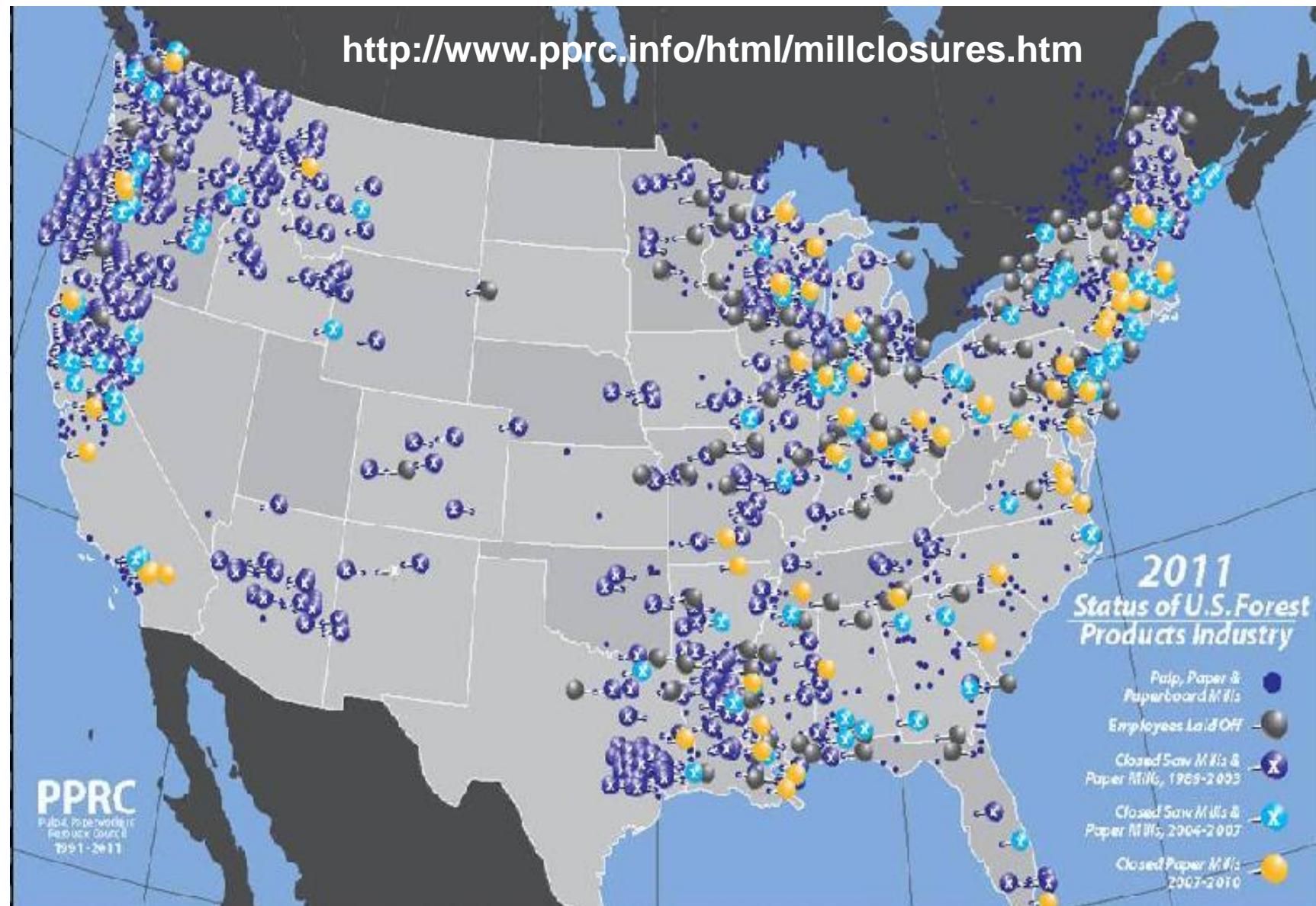
Total Paper and Paperboard Consumption North America vs. Other Selected Regions



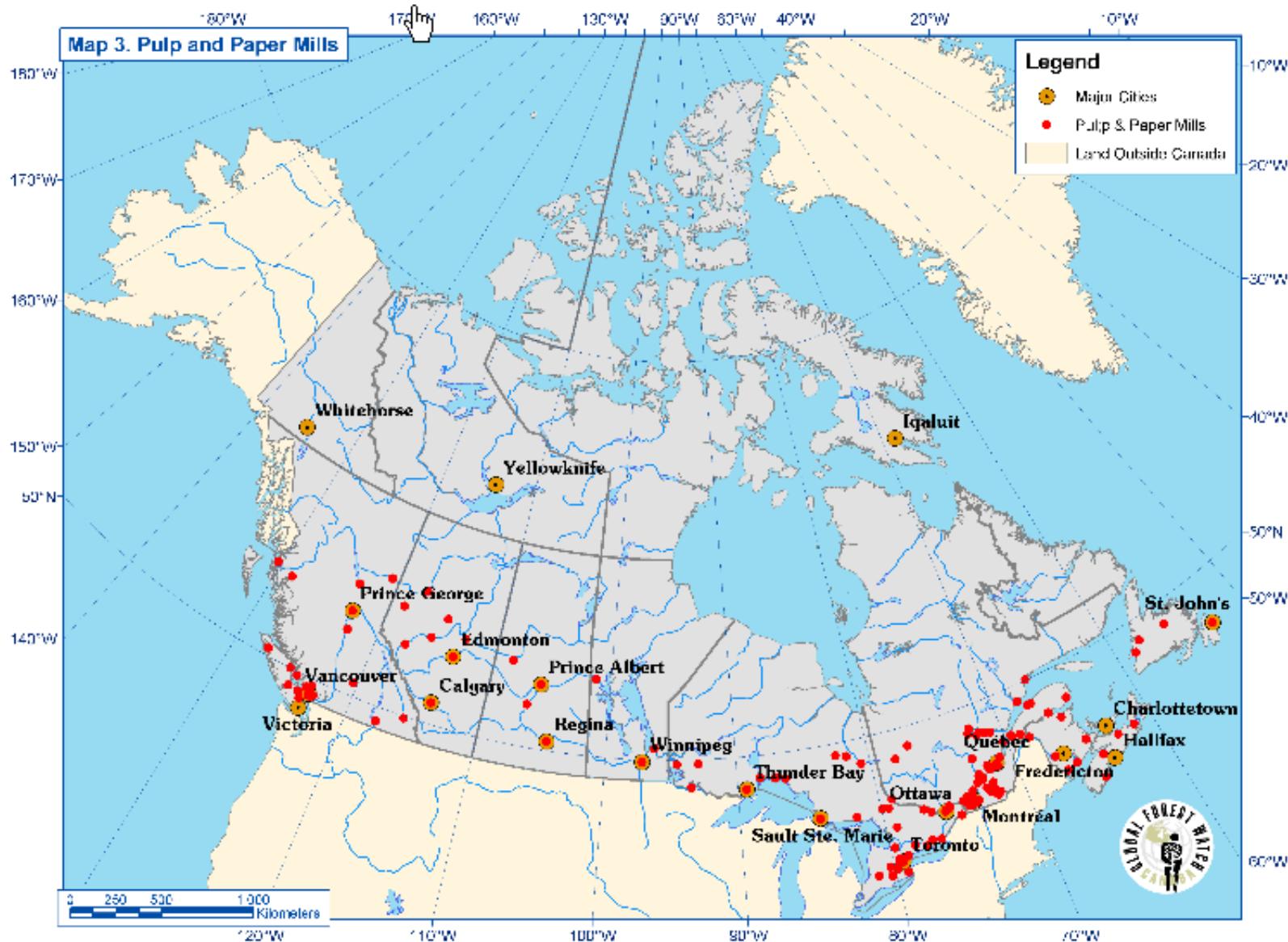
US Paper Segment Breakdown (Tonnage)



<http://www.pprc.info/html/millclosures.htm>



Canadian Pulp and Paper Mills



EMPLOYMENT

Forestry & Logging	107,100
Wood Products	388,600
Pulp & Paper	<u>391,400</u>
Total Employment	887,100

ANNUAL PAYROLL INCOME *(in thousands of dollars)*

Forestry & Logging	\$3,073,000
Wood Products	\$16,501,000
Pulp & Paper	<u>\$29,911,000</u>
Total Compensation	\$49,485,000

NUMBER OF MANUFACTURING FACILITIES

Sawmills, Millwork, Treating	674
Engineered Wood and Panel Products	186
Other Wood Products	<u>125</u>
Total Wood Products	985
Pulp, Paper & Paperboard Mills	367
Converted Paper Products	<u>4492</u>
Total Paper Manufacturing	4859
Total All Segments	5,844

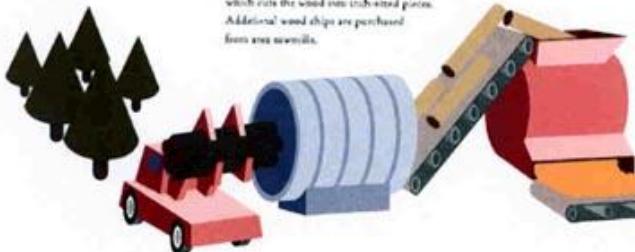
Source: AF&PA
as of Dec/2012

NewPage Handles Every Step of **THE PAPERMAKING PROCESS...**

1

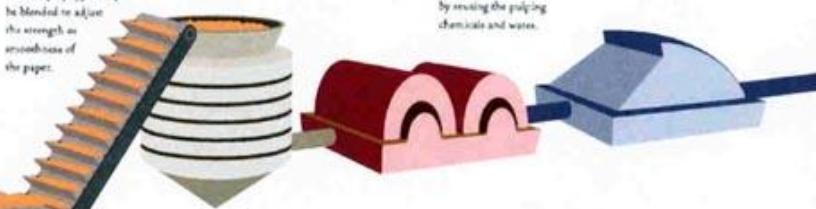
Debarking and Chipping

The wood yard receives rough logs. The logs are lowered into a debarker that removes the bark for use as fuel in the plant's stoves. Sodas. The clean logs are moved by conveyor to a chipper, which cuts the wood into individual pieces. Additional wood chips are purchased from area sawmills.

**2**

Sorting Chips

Chips are separated by wood type—hardwood and softwood—to create different kinds of pulp. Various pulp types may be blended to adjust the strength or smoothness of the paper.

**4**

Washing

The pulp is washed and screened to clean the fibers and remove chemicals and other impurities. Raw materials are recycled by reusing the pulping chemicals and water.

5

Bleaching

The pulp passes through a multi-stage bleaching process to achieve the whiteness and brightness levels required for various products. All papers manufactured in NewPage mills are acid-free and elemental chlorine free.

10

Coating and Calendering

Paper is coated by running the sheet through a coat of coating liquid (e.g., starch, clay, latex, dye). The excess coating is scraped off, and the paper is dried and calendered. Calendering (rolling) reduces thickness, smooths the surface and buffs the coating. At the end of calendering, water content is between 25-35%. Approximately 80% of the paper that we manufacture is coated with enamel coatings for our coated papers.

9

Drying

The sheet runs through a series of steam-filled rollers that evaporate the water content to about 4-5%. Although it is wet, the sheet can move through the rest of the paper-making equipment; it is wound onto large rolls, weighing about 8 to 30 tons.

**11**

Cutting and Sheeting

The rolls are cut and re-wound into smaller rolls. Rolls can be delivered to customers for web press production or cut into individual sheets for sheet fed presses.



Computer Control

Technicians in computer control rooms monitor and control the pulp heating and mixing process as well as all the papermaking equipment.

**6**

Beating/Refining

The pulp is piped into another series of machines, where it is beaten and refined. Rotating bars or knives slice the fibers into shorter pieces and fray their surfaces for better bonding. Different types of paper are created by adding dyes, starches, opacifiers, brightness enhancers or recycled pulp.

**7**

The Fourdrinier Wire

The pulp is about 99.5% water when it reaches the papermaking equipment, where it is released onto the Fourdrinier wire. The wire web catches the pulp fibers as the water flows through. The ejection and motion of the water distributes the fibers evenly on the wire web.

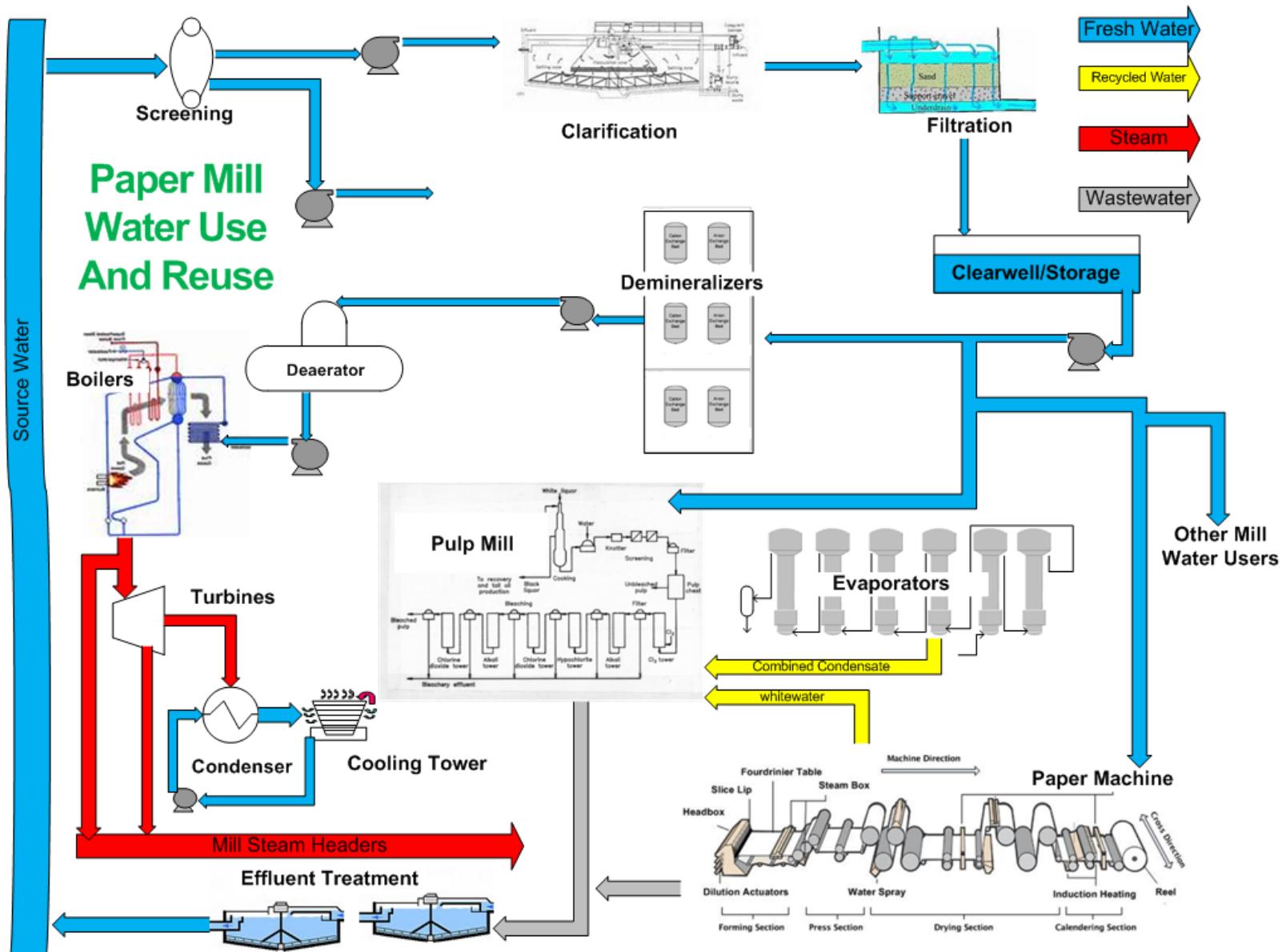
**8**

Felts

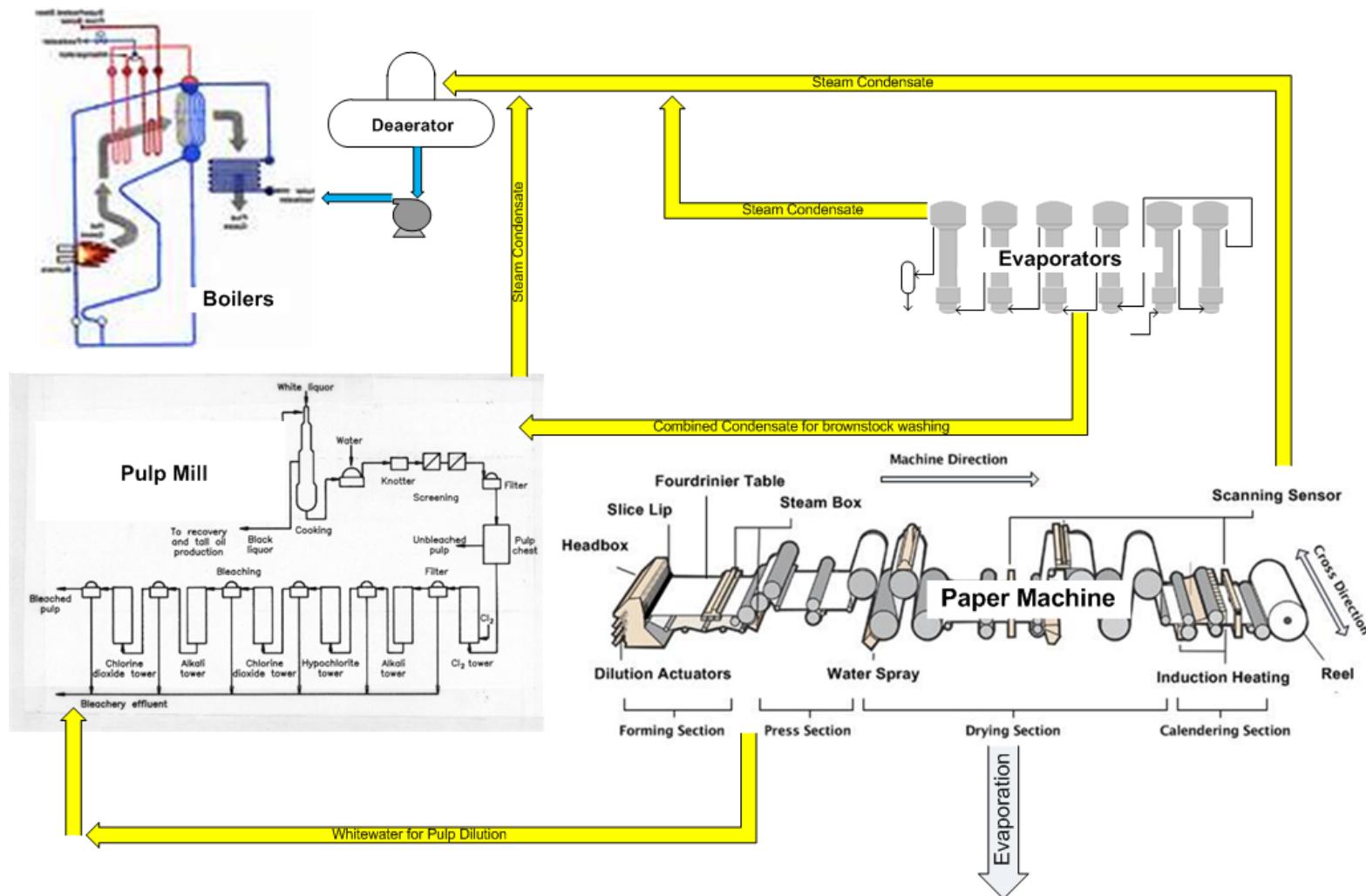
The web passes through felt rollers that squeeze the pulp, reducing the water content to about 75-80%. Although it is wet, the sheet can move through the rest of the paper-making equipment; it is wound onto large rolls, weighing about 8 to 30 tons.



Water Use and Reuse In Papermaking Overview



Paper Mill Major Water Recycle Streams



Millions of gallons per day

Fiber = \$

Coating = \$

Organics

Heat = \$

Water = \$

**Thank You
Questions?**