Global Recovered Paper Outlook

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MOORE
& Associates

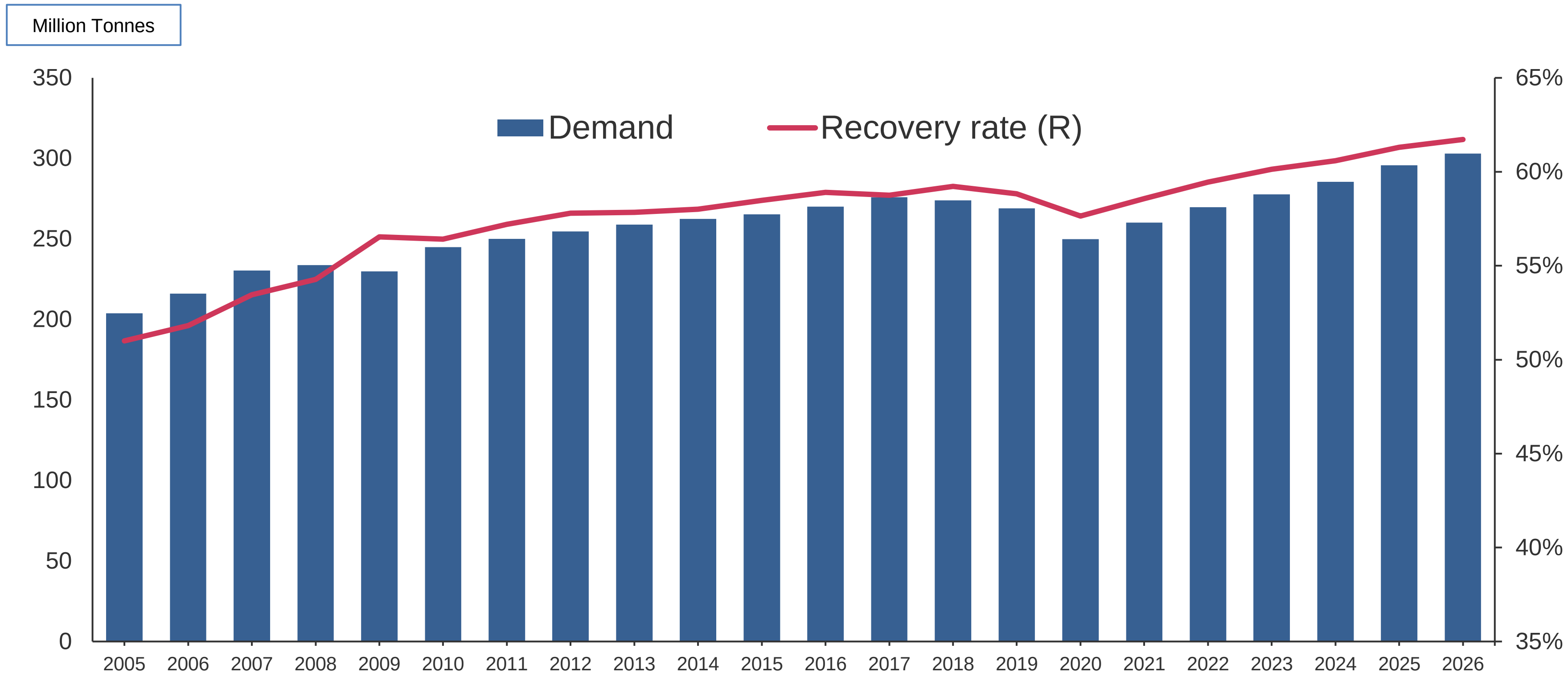
Consultants to the Global Paper Recycling Industry

- Global recovered paper market experts
- Based in Atlanta, worldwide practice
  - Market Research/Analysis
  - Recycling Business Strategy
  - Pricing Analysis
  - Recovered Paper Purchasing Optimization Assistance
  - Innovative Supply Sourcing and Development
  - Sustainability Analysis and Support

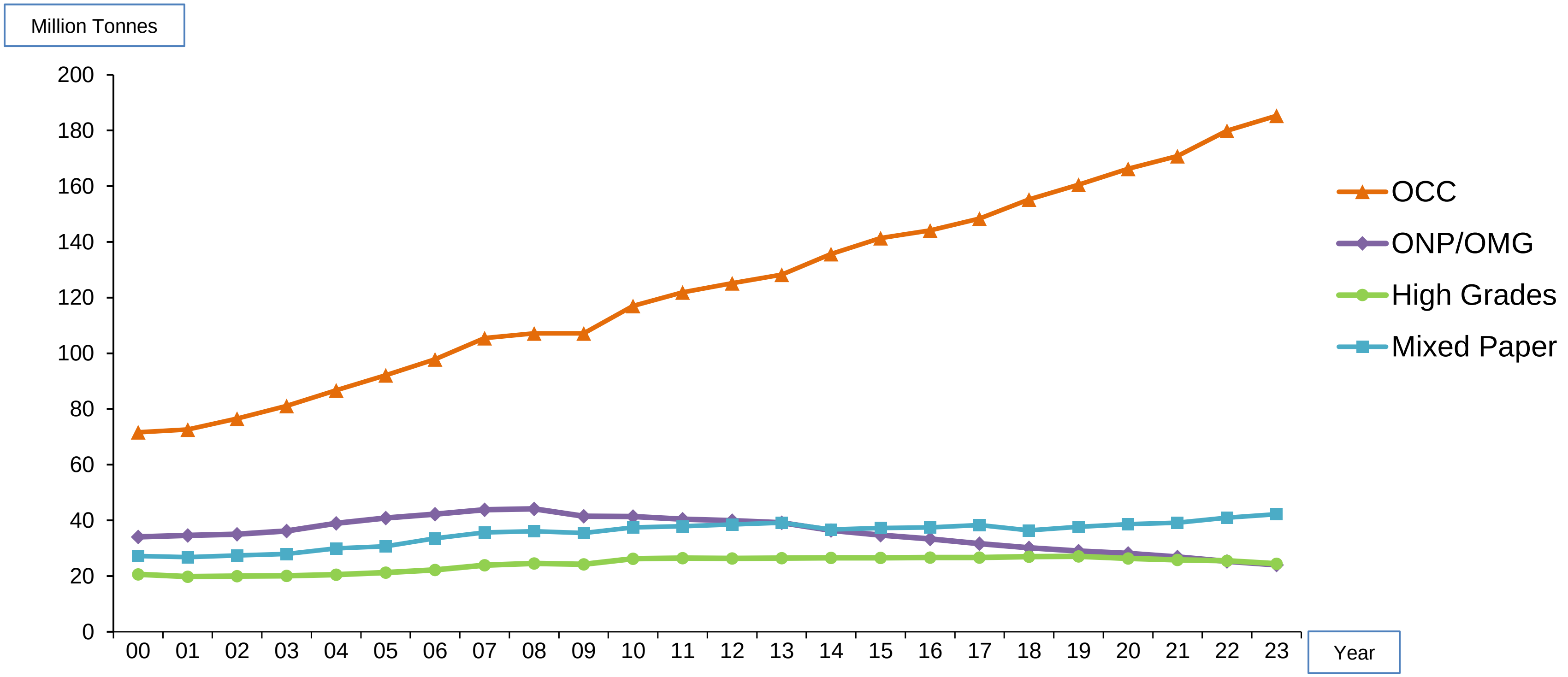
Terminology

- RcP – Recovered Paper (US)
- PfR – Paper for Recycling (Europe)
- ~~Wastepaper~~
- Tons – short tons (used in US)
- Tonne – metric tonne (used by rest of the world, including ASEAN countries, US exports of RcP are in tonnes) ~ 1.1 tons = 1 tonne
- Prohibitives – non-paper contaminants in RcP

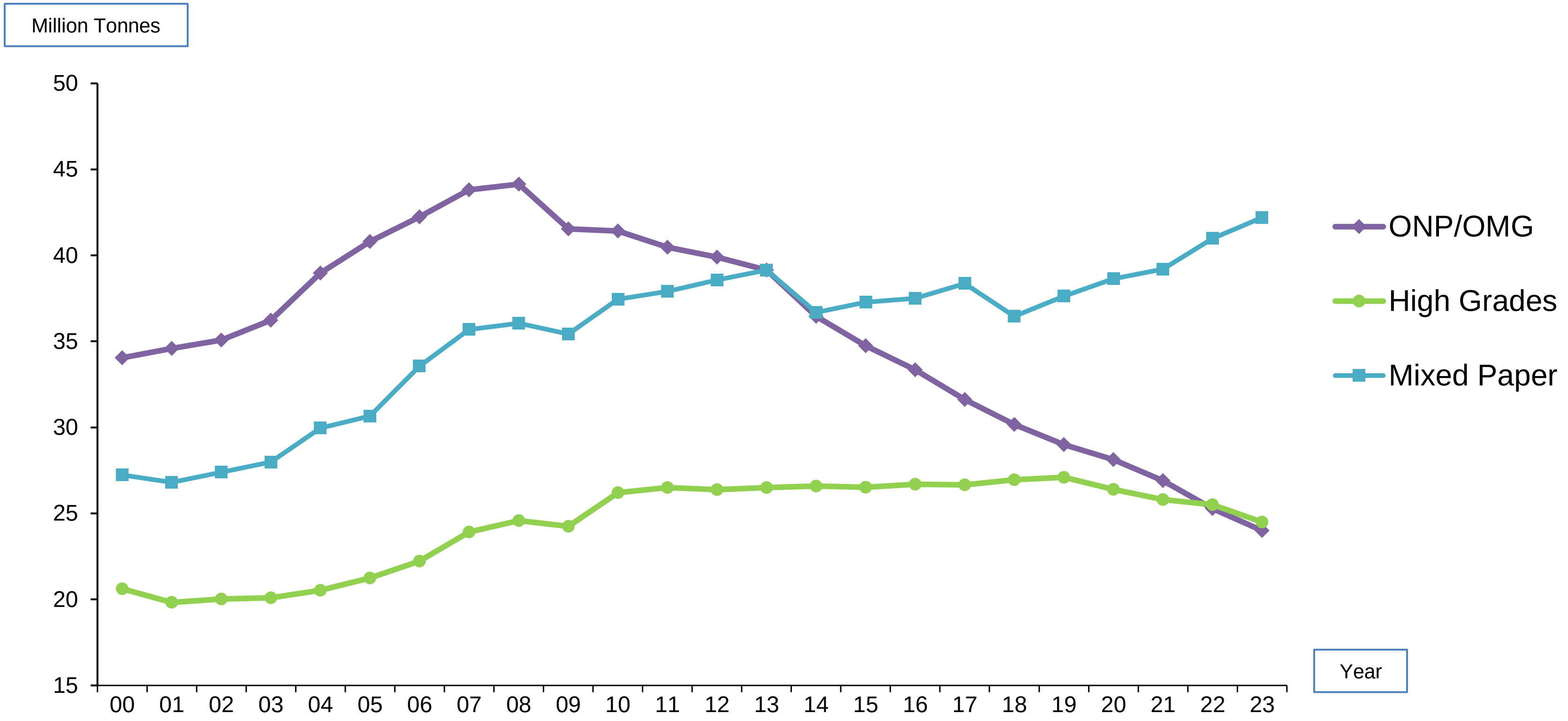
Global Paper for RcP Demand & Recovery Rate



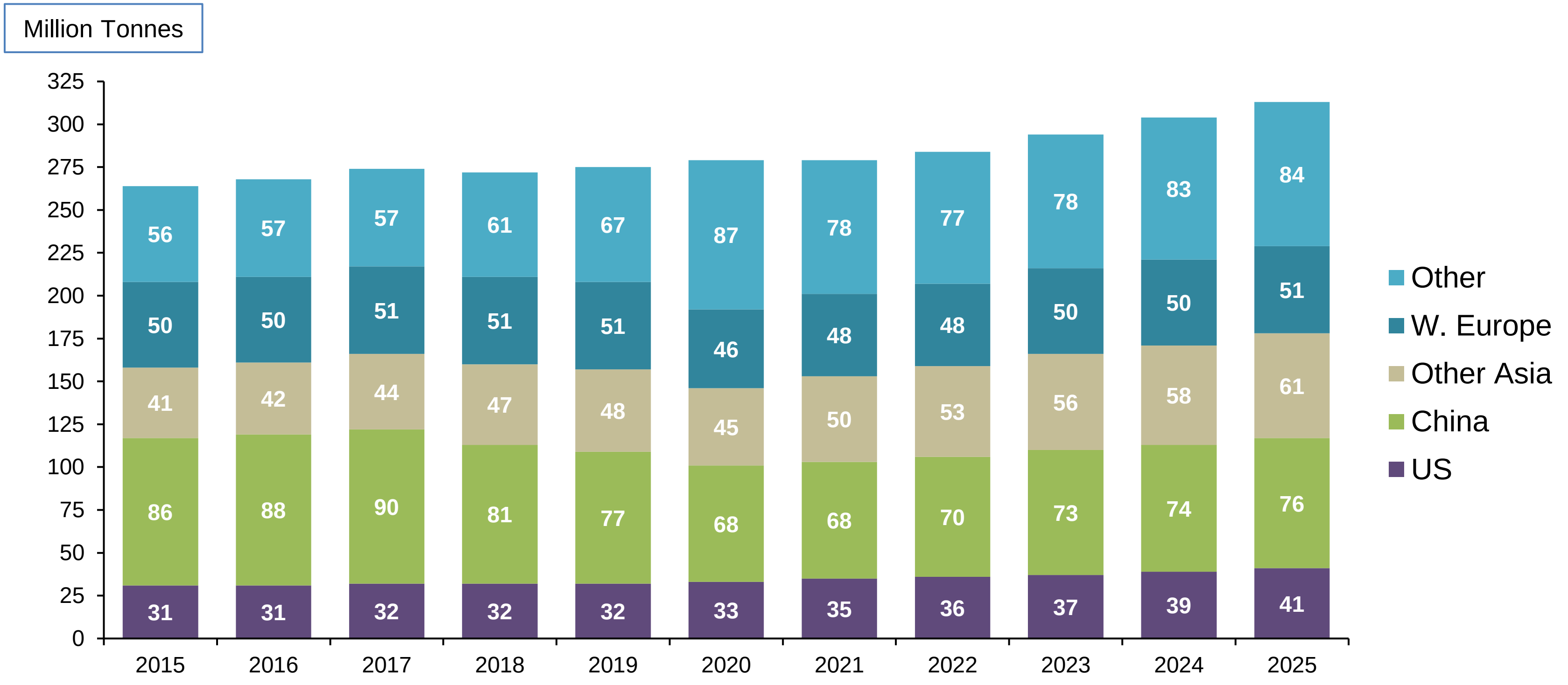
Global RcP Demand by Major Grade Category



Remaining Grades Without OCC

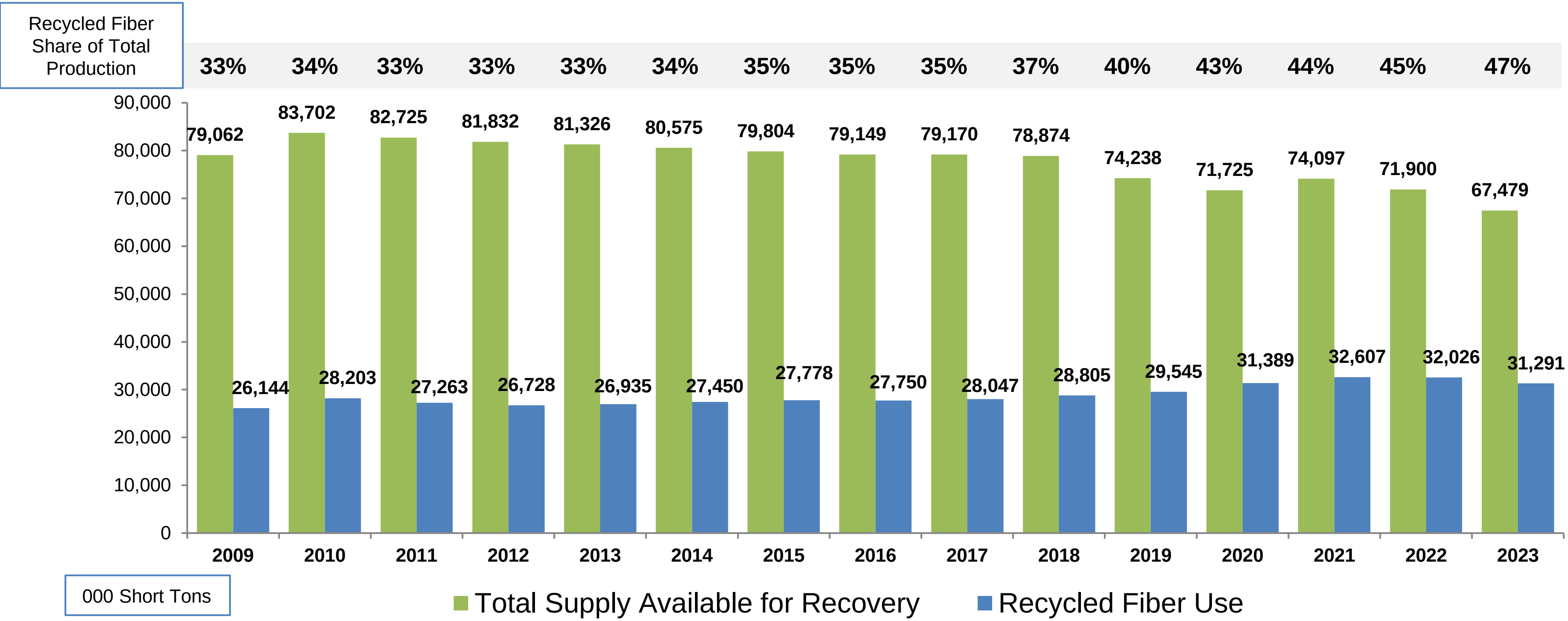


Global RcP Demand by Region



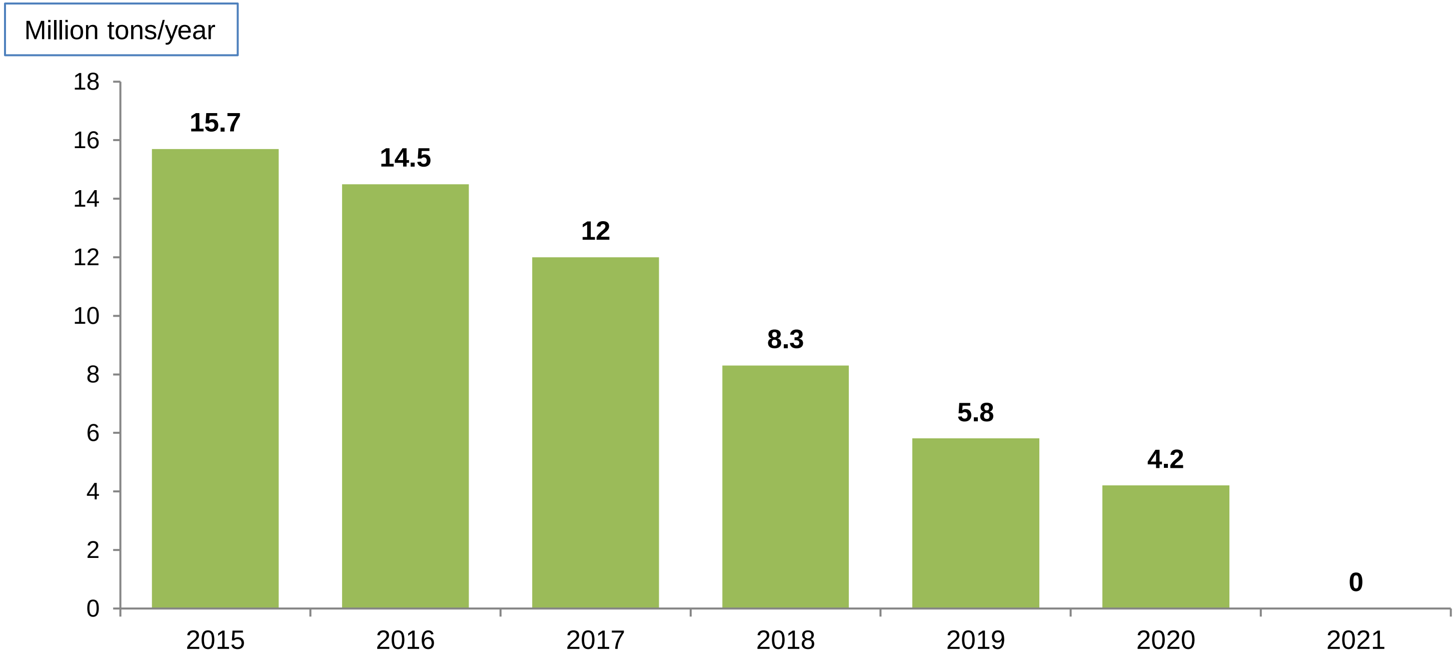
United States

Recycled Fiber Use in US Paper & Paperboard Supply Available for Recovery:
Paper use is declining while paperboard (for boxes) and recycled fiber use is increasing

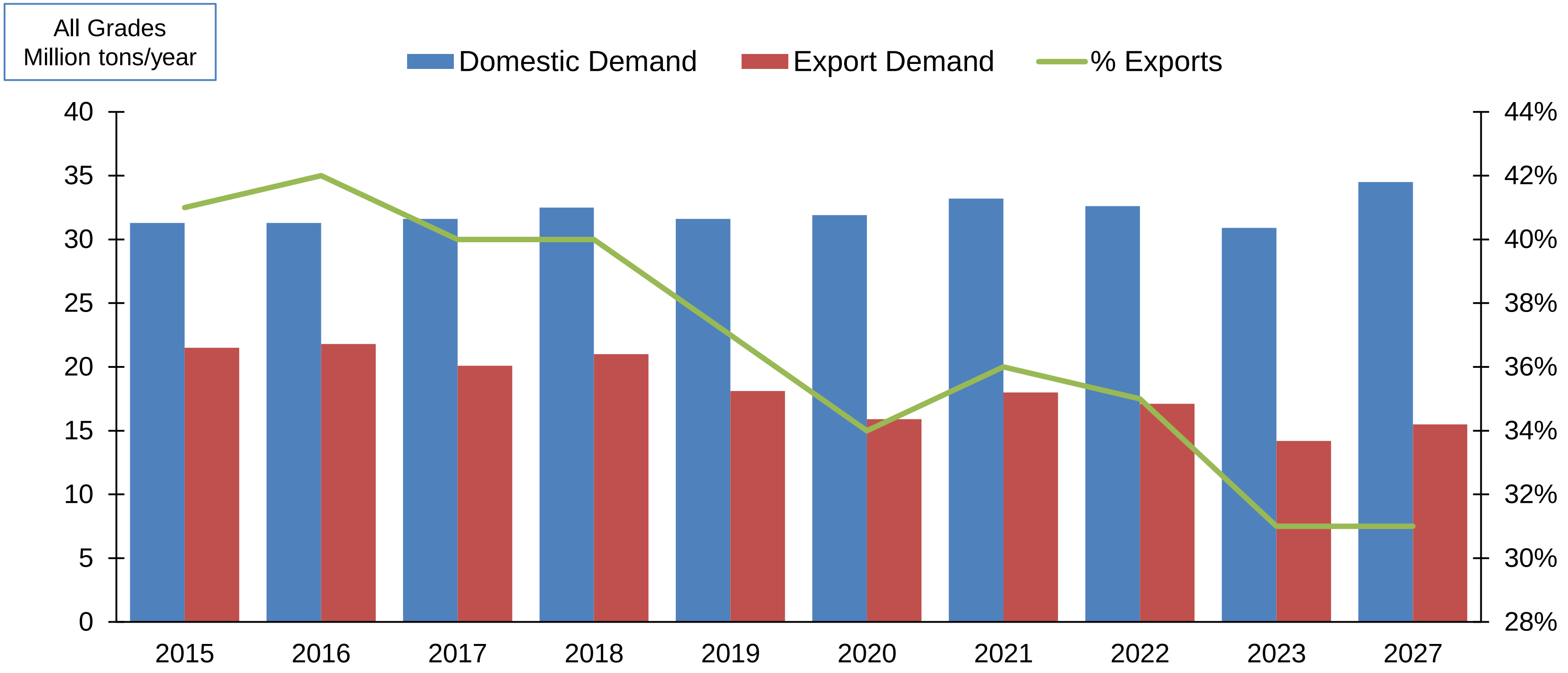


Source: www.paperrecycles.org and Moore & Associates

US RcP Exports to Mainland China - Endgame



US Domestic and Export RcP Demand



US RcP Exports (all grades) to Select Asian Countries First Six Months of 2020 vs 2024 (tonne - rounded)

- Jan – June 2020
  - India - 912,000
  - Thailand - 268,000
  - Malaysia - 84,000
  - Vietnam - 516,000
  - S. Korea - 415,000
  - Taiwan - 362,000
  - Indonesia – 238,000

- Jan – June 2024
  - India - 1,060,000
  - Thailand - 925,000
  - Malaysia - 902,000
  - Vietnam - 900,000
  - S. Korea - 483,000
  - Taiwan - 199,000
  - Indonesia -144,000

- % Change over period
  - 16%
  - 246%
  - 976%
  - 40%
  - 4%
  - (-45%)
  - (-40%)

Japan & Korea

RcP Exports & Domestic Use – 2023 (tonnes)

- Exports:
  - All grades – 2.2 million – up 21% from 2022
  - OCC – 1.55 million – up 46% from 2022
  - Jan – July 2024 – same level of exports as in 2023
- Domestic mill consumption ~ 15 million – down 6.4% from 2022
- Japan's domestic consumption of RcP has been declining for a number of years, with exports increasing
- Japan's RcP supply has some of the world's lowest level of contaminants
- The ASEAN countries' paper industry knows Japan well as they are a large supplier of RcP to the region

RcP Supply/Demand Evolution

- Through the mid-1990s, Korea was a net RcP importer
- In the 1990s, the country embarked upon a successful program to raise the paper recovery rate
- The increase in recovery rate coupled with a downturn in paper produced (Korea was a sizable producer of newsprint) swung the country to an RcP exporter in the 2000s
- This same profile occurred in Japan, about 10 years earlier
- Korea’s increased paper recovery program experience may be of interest to the ASEAN countries

Europe

European Paper & Board Production & PfR Use

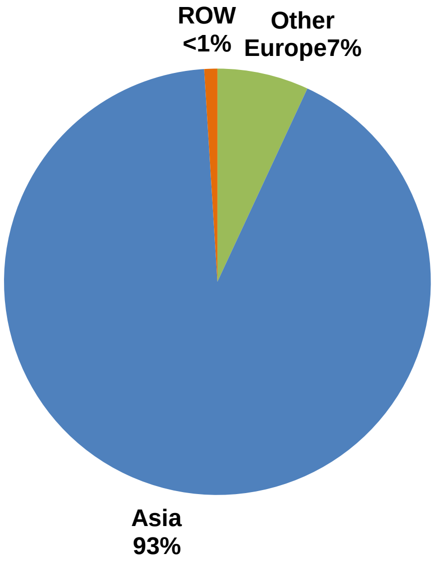
- Packaging and OCC are where the action is!

Year	P & B Production (Tonne/Year)	Graphic Papers	Packaging Grades	Tissue	Other	PfR Utilization (Tonne/Year)	OCC Consumption (Tonne/Year)	Overall Recycling Rate
2013	91.1 million	42%	46%	8%	4%	47.5 million	21 million	71.7%
2023	73.9 million	23%	62%	10%	5%	44 million	27.7 million	79.3%

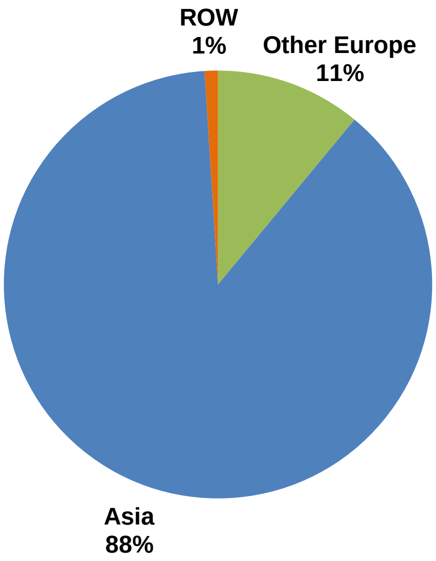
- The paper industry biggest problem in Europe is significant containerboard overcapacity

CEPI Europe PfR Exports by Destination, 2015 & 2023

2015
~10.1 million tonnes



2023
~9.4 million tonnes



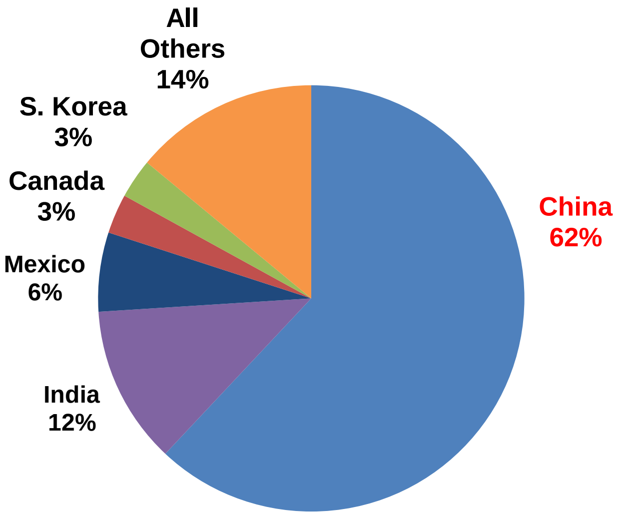
Old Corrugated Containers (OCC)

OCC Supply Trends

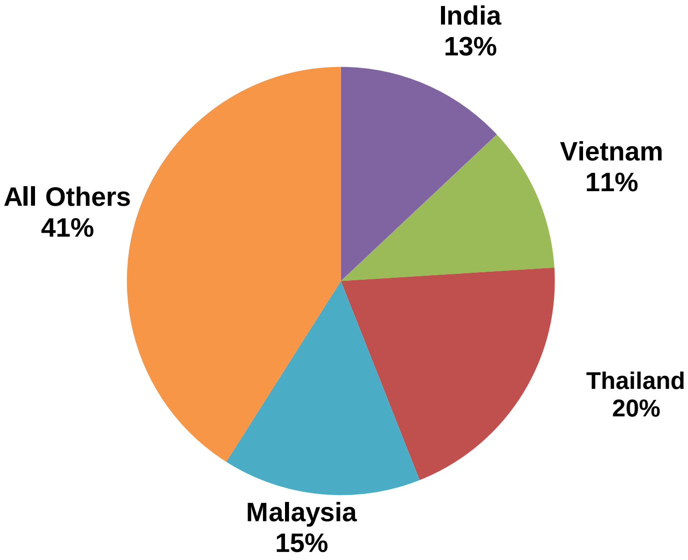
- OCC recovery in the developed regions of the world is very high, really at the maximum level in many parts of Europe and headed that way in the US, but box supply growth continues
- India and the Southeast Asian countries will continue to increase their domestic OCC recovery
- China moving to use more wood fiber
- All of the 'easy to get' OCC is already recovered – grocery store and large generators. Even in the developed countries, residential e-commerce box recovery is lagging, especially multi-family and small commercial sources.
- But we are not ‘running out’ of OCC that can be recovered. In the U.S.– about 20 million tons per year of paper is still disposed, OCC is a part of it and corrugated box demand is increasing
- The emerging and developing countries of the world are disposing of significant quantities of OCC

US OCC Exports by Destination, 2017 & 2023

2017
~10 million tons



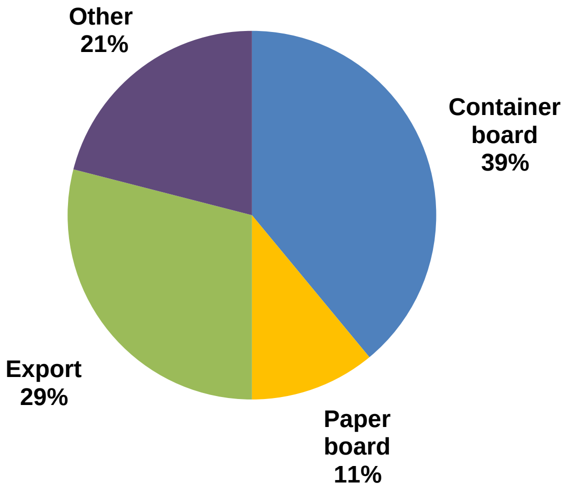
2023
9.6 million tons



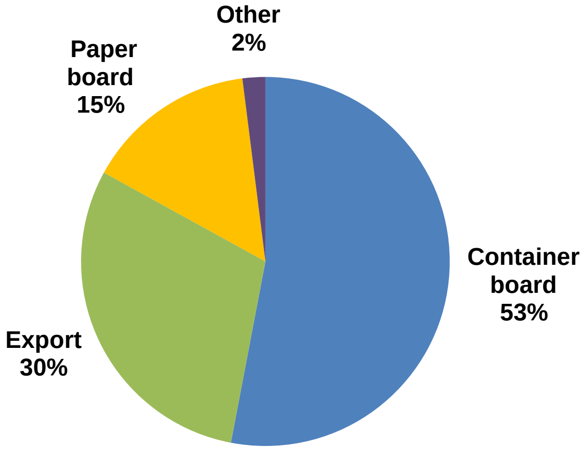
Source: US Dept. of Commerce and Moore & Associates

Usage of US OCC, 2017 vs. 2027

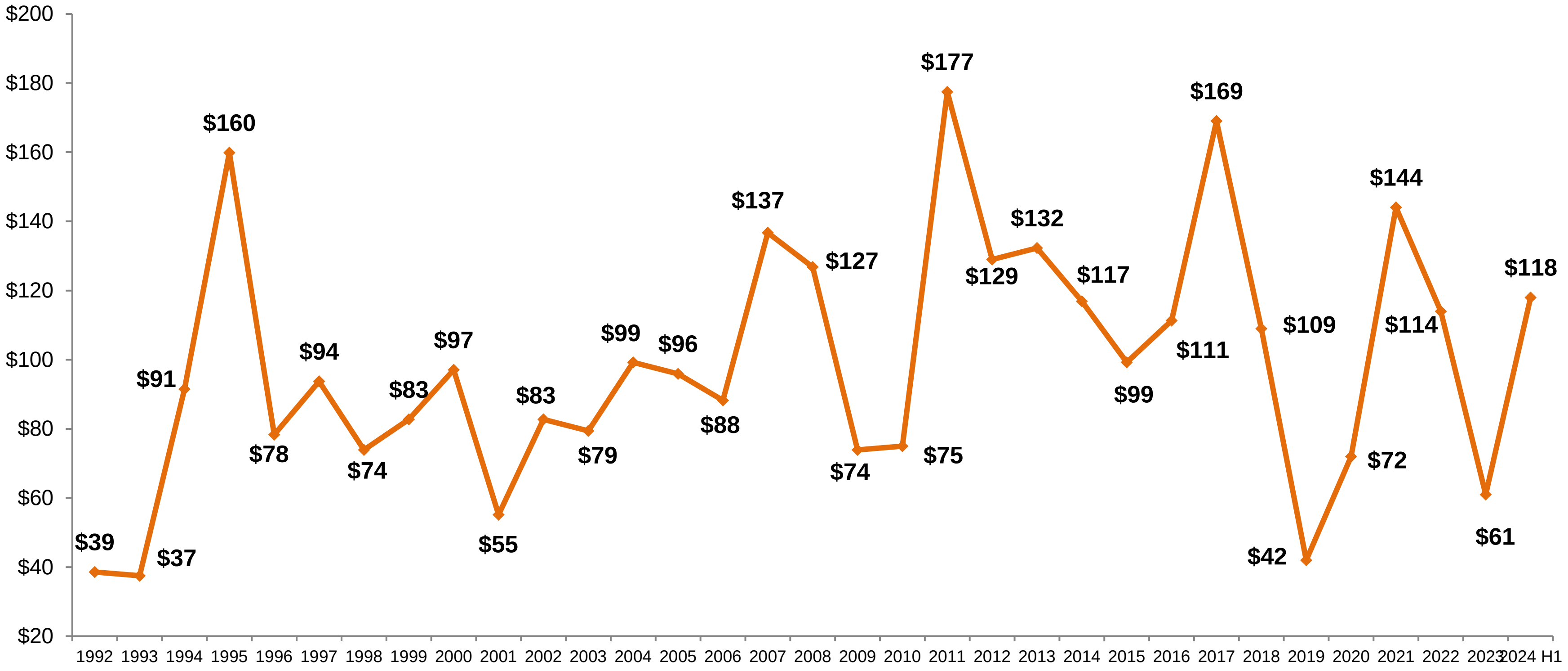
2017
~34 million tons



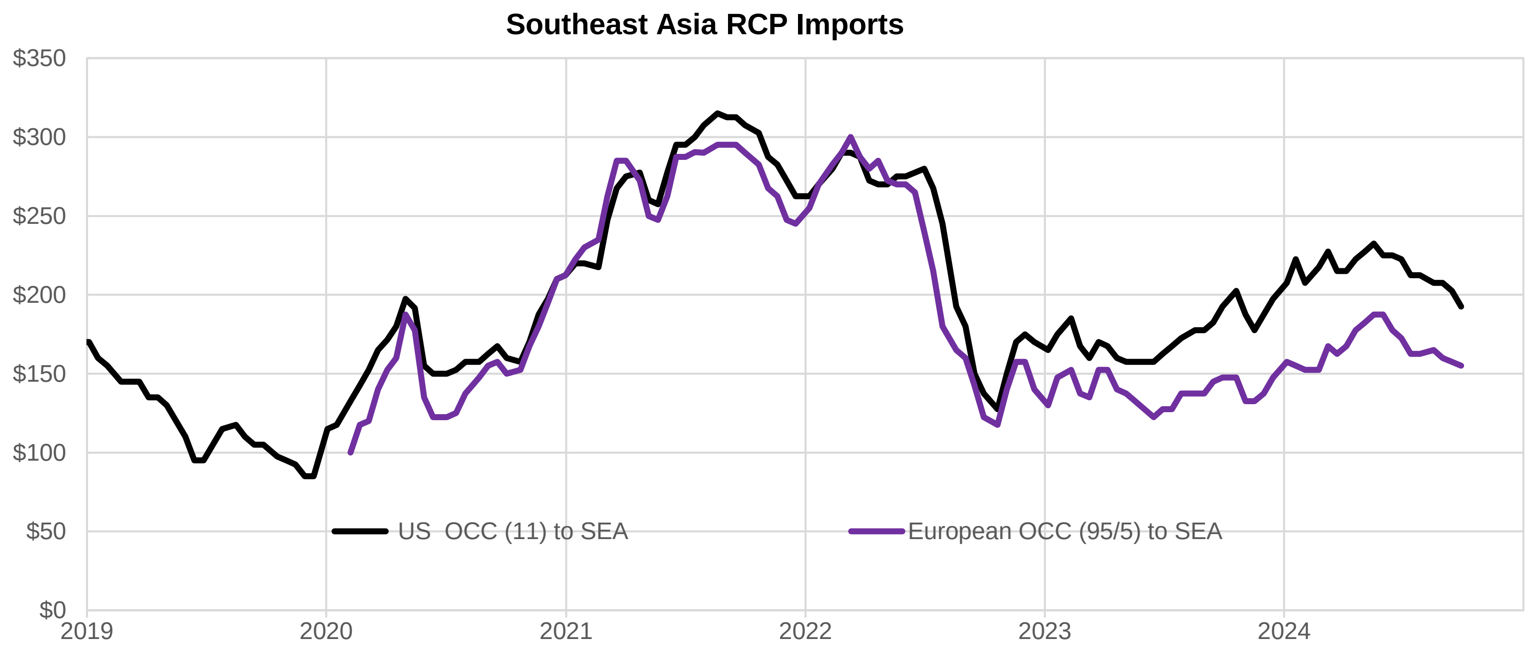
2027 - Forecast
~38 million tons



Average Annual US #11 OCC Prices



5+ Years OCC Import Prices to Southeast Asia (US dollars/tonne)



Source: Slide/pricing data courtesy of Nick Chang, Fastmarkets RISI PPI Asia editor

OCC Market - Where Do We Go from Here?

- Short term:
  - Prices that have moved up steadily early in 2024, have retreated for the last quarter due to the US east coast short dockworkers strike and more recently soft corrugated box business. The hold on the docker workers strike is only for another 60 days.
  - Expect prices to tick up over the next quarter to regain the recent decreases, if there is no dock workers strike
- Longer term forward looking:
  - Box demand around the world is growing, expect periodic new containerboard machines in Asia
  - Nothing planned in North America, excess capacity in Europe is significant
  - New containerboard machines will run, they will be the most efficient and lowest cost
  - Expect closures of high cost, old & small containerboard machines (and possibly bankruptcies)
  - But OCC is a key raw material for the world’s production of corrugated boxes
  - Overall OCC trendline prices will continue to move up, with downward pricing occurring with softness in the global/regional economies

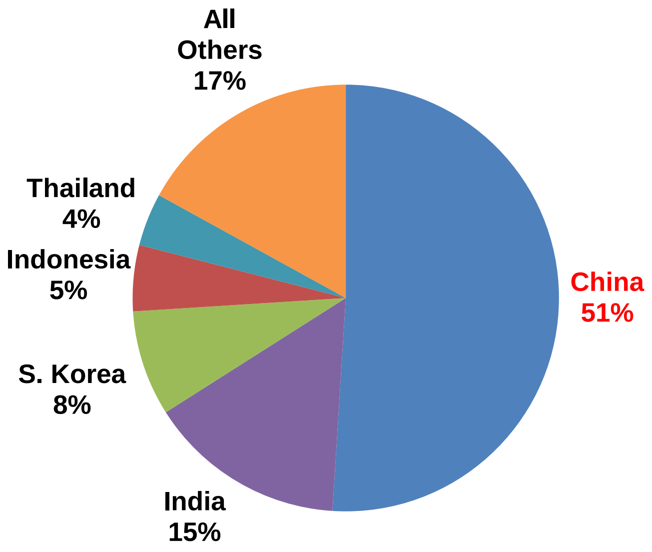
Mixed Paper

Asian Countries Acceptance of US Mixed Paper

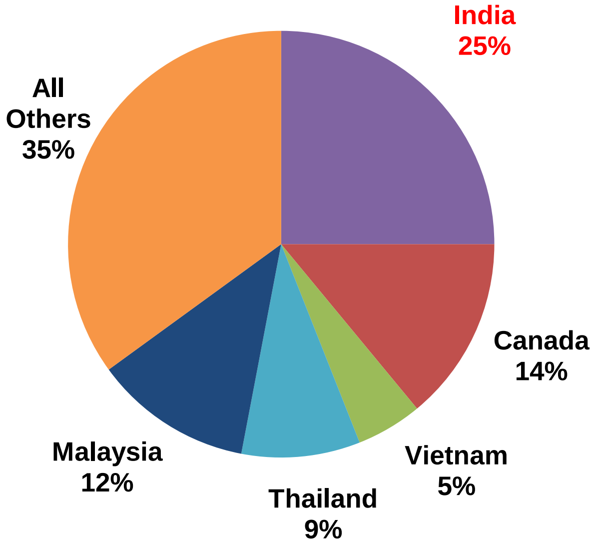
- Other Asian countries have asked themselves – if it is not good for China to import Mixed Paper why should it be good for us?
- Vietnam 'officially' banned imports of Mixed Paper as of the end of 2021, but has allowed Mixed Paper imports to continue for those who had import permits in place – but Vietnam plans to ban imports once those permits expire – end of 2024
- Indonesia and India have been back and forth on the level of prohibitives they will allow in Mixed Paper imports, and inspections are needed. Indonesia has settled in at 2% Prohibitives.
- The latest country to announce a ban on imports of Mixed Paper is Malaysia. #56 Sorted Residential Paper & News is allowed (which is very close in composition to Mixed Paper, but generally is a bit cleaner).
- The above four countries are/were large importers of Mixed Paper from North America
- Some consensus in Asia that the Prohibitives levels in Mixed Paper need to be capped at 0.5 to 1%, which is very difficult to obtain economically from North American residential recycling processing facilities (MRFs)

US Mixed Paper Exports by Destination, 2017 & 2023

2017
~4 million tons

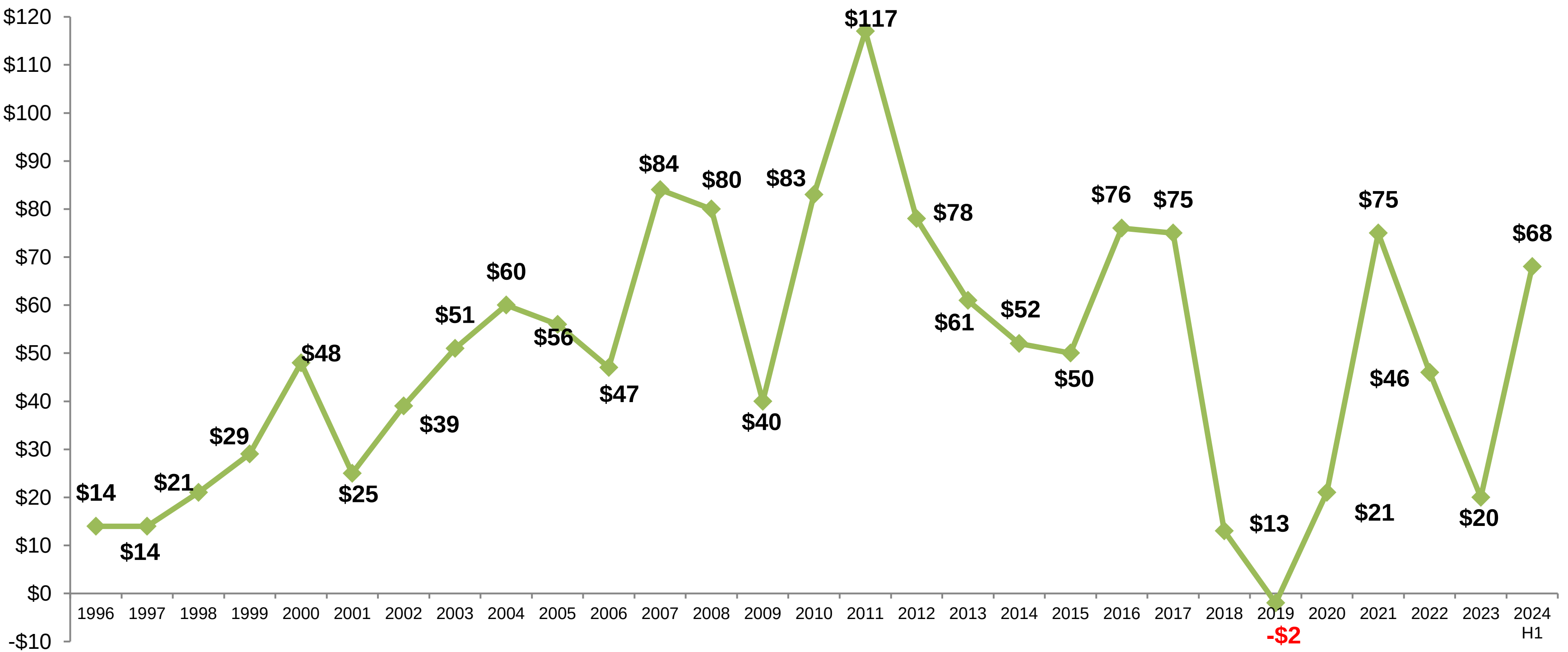


2023
~2 million tons



Source: US Dept. of Commerce and Moore & Associates

Average Annual US #54 Mixed Paper Prices



Mixed Paper Market Outlook

- The Mixed Paper market was chronically oversupplied even before China pulled out. It is the most under-recovered paper grade, so oversupply is always possible, with sharp price declines
- When OCC prices are up, board mills seek more Mixed Paper, prices go up
- OCC demand will outpace supply – other fiber will be needed to make paperboard grades
- Steady new demand for Mixed Paper at new mill projects will stabilize the market.
- The continuing restrictions on exporting North American Mixed Paper to Asian countries could cut a significant portion of the grade's export demand
- Mixed Paper recovery rate much lower than OCC
- But in the developed countries (Japan, US, Europe) supply of Mixed Paper is declining at newsprint and printing/writing paper use declines
- The composition of Mixed Paper changes as boxboard grades levels increase

Opportunities for Increased Paper Recovery in Southeast Asia

What are the Drivers of Paper Recycling in a Country

- Strong demand and high prices for RcP – The ASEAN countries already has these, as do many other emerging Asian economies
- High disposal costs:
  - Where paper recovery rates are the highest: countries with high-cost disposal: Germany, Japan, some parts of the US, the Benelux countries, and some other western European countries
  - Moderate cost disposal countries include: overall US, Canada, and China’s main cities
  - Low-cost disposal: India (large cities higher than the rest of the country), rural China, and most of the emerging economies of the world
  - Outside developed countries of the world (such as Western Europe, the US, Canada, Japan, etc.) much disposal is uncontrolled landfills, without state of the art environmental controls
- A government regulatory climate that favors recycling:
  - This frequently is linked to the above bullet on disposal costs
  - But also can be policies that support more recycling
  - Will advancing ASEAN environmental laws foster better recovery rates?

Ways to Increase Paper Recycling in a Country

- The paper industry can get involved proactively with the government to raise people awareness on recycling and pro-environment awareness
- Encourage a system of ‘paper only’ collection from businesses and industry – Spain took this approach some years back to raise their paper recovery
- As mentioned earlier in this presentation, Korea is a good example of a country that was an importer of RcP through the 1980s and raised their paper recovery in the 1990s and they are now an exporter
- Regulations requiring businesses to recycle
- The paper industry should engage with governments at all levels (country, provincial, & local) to foster more paper recycling

US Extended Producer Responsibility Laws – Impacts for ASEAN Mills RcP Imports

Extended Producer Responsibility or EPR

- EPR has been implemented in Europe & Canada for years: in the US for now it is state by state laws
- Two key factors drove the US movement to EPR: low plastic packaging recycling rates and low RcP & scrap plastic prices after China banned imports of recyclables and material market values plummeted. This led to major increases in the cost of US recycling programs (service fees more than doubled)
- EPR legislation in the US is a practice and policy approach in which ‘producers’ take responsibility for managing the end-of-life of products and packaging they generate.
- EPR shifts the end-of-life burden to manufacturers and retailers that profit from the sale of consumer products and away from consumers who now pay for recycling services.
- Producer responsibility may be financial or operational, or both.
- It also seeks to make the producers design packages that are more easily recyclable
- The five US states that have EPR legislation passed are: Oregon, California, Colorado, Minnesota, and Maine. More states will pass EPR laws in the future.

Working Together to Make It Simple

- Moore *& Associates* is supporting Circular Action Alliance (CAA), who is the PRO (Producer Responsible Organization). CAA is currently responsible for implementing EPR programs in Oregon, California, and Colorado.
- Moore *& Associates* is requesting support from paper associations in the countries who import RcF/RcP from the western US: Vietnam, Malaysia, Thailand, Indonesia, S. Korea, & Taiwan
  - Step 1 > Request environmental laws and regulations for each country (for all mills)
  - Step 2 > Work with each Association to identify paper mills with US RcP imports
  - Step 3 > Moore *& Associates* creates a mill list for each country with contacts
  - Step 4 > Communication with mills to answer questions and confirm REM data

    Request Association's help to communicate with the mills

    Help with language barriers and other challenges

Impacts to Paper Mills in Asia

- Recycled Fiber (RcF – recovered paper) grades imported from Oregon and California will need to be shipped to paper mills who have been evaluated and approved to meet "Responsible End Market" (REM) criteria.
- <u>EPR Program Start Dates:</u> Oregon: July 1, 2025 and California: Jan. 1, 2027
- What are the REM requirements for mills?
    - Compliance to local laws and regulations
    - Operate mills in a responsible environmental manner
    - Chain of custody documentation - from US supplier to Asian mill
    - Measure recycling yield percentage – for now the requirement is 60% yield, easily obtainable by recycle mills
    - Willingness to be audited - advance notice and list of questions

Thank You for Your Attention

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