

TIRE DERIVED FUEL – PAST, PRESENT AND FUTURE

BY

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COLORADO'S 2015 WASTE TIRE
CONFERENCE

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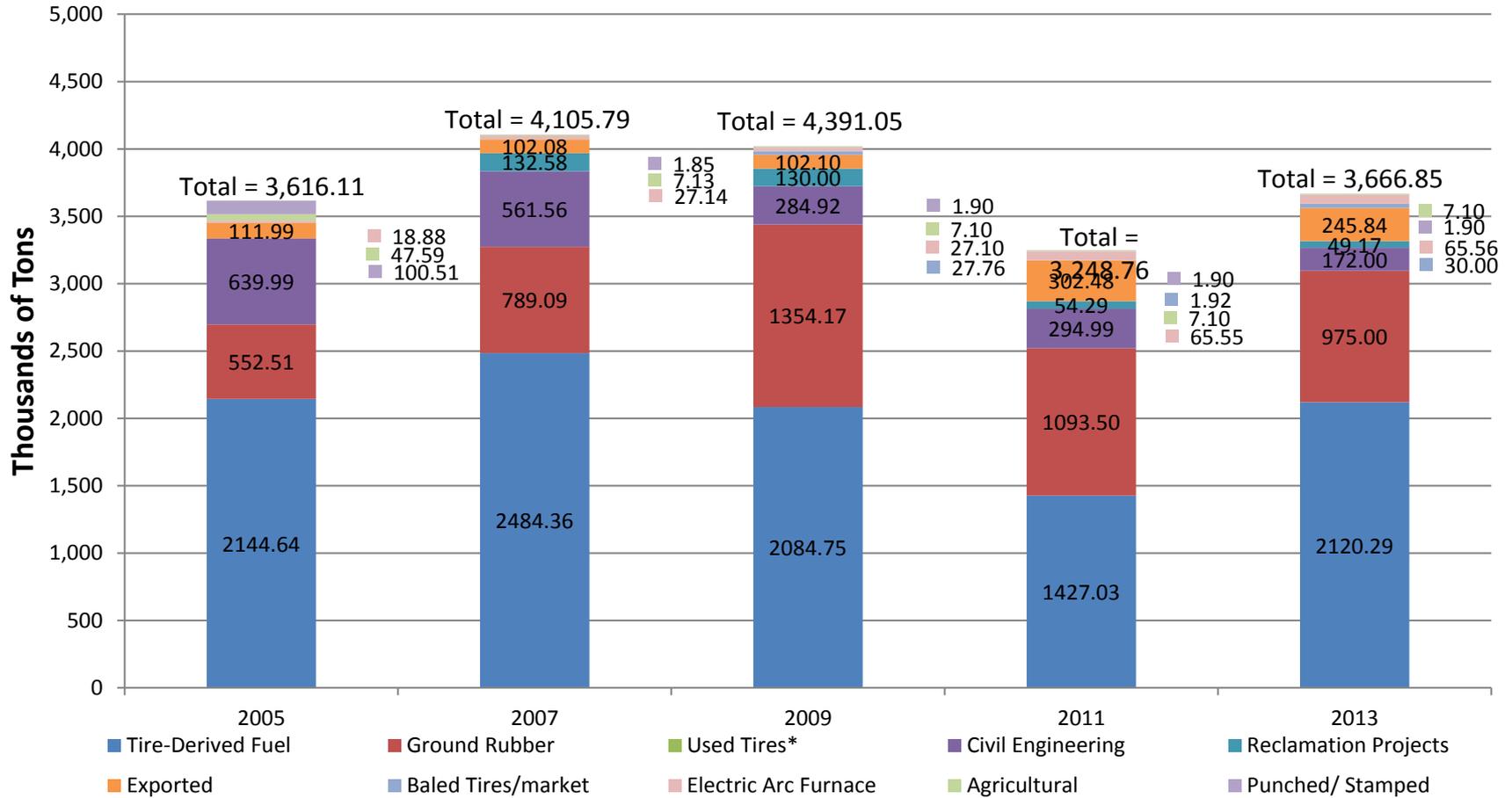
PAST

- TDF has been used in the U.S., Europe and Japan since 1970's
- Goodyear installed a Lucas Furnace using waste tires as fuel in early 1970s
- GM experimented with TDF in a power boiler in the mid-1970s
- Mike Rouse experimented with rubber buffing dust to replace scarce oil for a waste wood boiler at his Georgia Pacific paper mill in the Pacific Northwest in 1974, explored available shredding equipment and initiated tire processing in conjunction with a landfill owner in Portland, OR

PAST (CONTINUED)

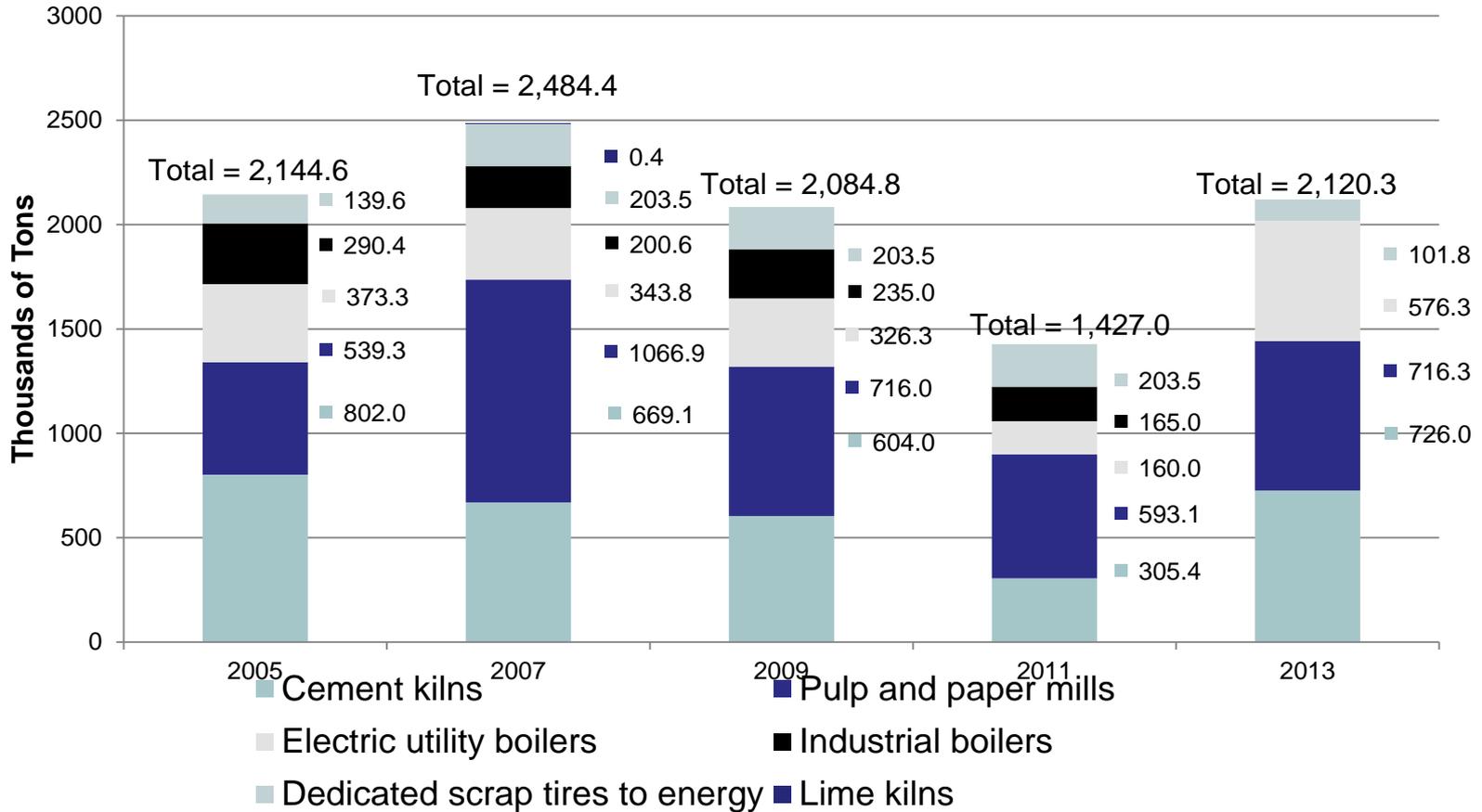
- Waste Recovery was formed in early 1980s to help Mike Rouse develop tire processing and TDF markets.
- Oxford Energy was formed in the mid-1980s to develop dedicated tire burning power generation facilities using 5-10 million tires per year in each facility.
- TDF became the first major market for waste tires.

TDF'S RECENT ROLE



Source: Rubber Manufacturers Association

RECENT TDF FLUCTUATIONS

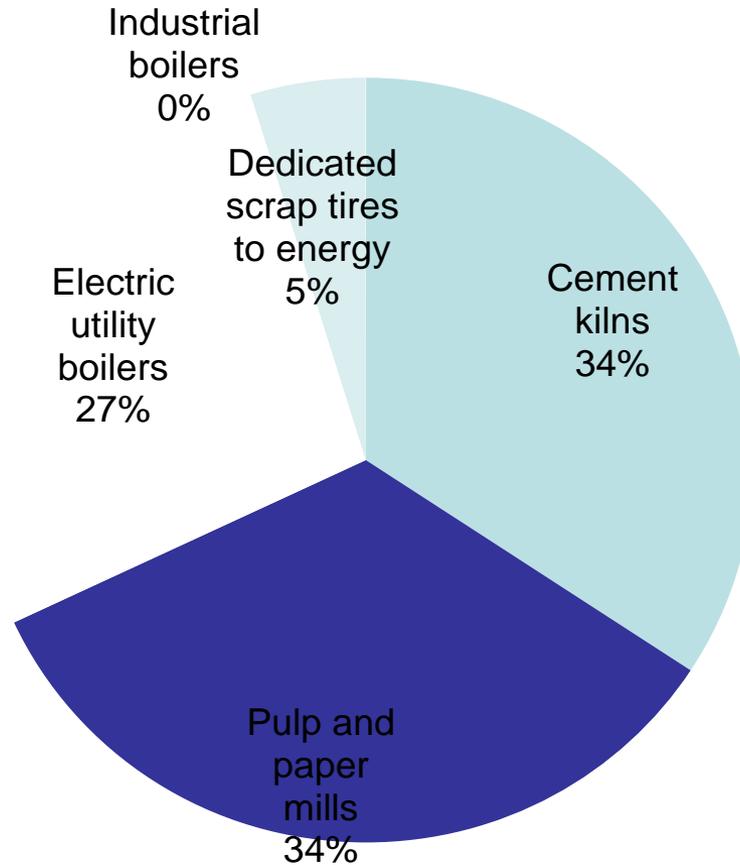


Source: Rubber Manufacturers Association

PRESENT

- TDF is the one of the largest end use markets for waste tires in most industrialized countries.
- TDF is the cornerstone of state waste tire management programs with appropriate facilities.
- TDF has not prevented development of other markets as demonstrated by current market diversity

MAJOR TDF MARKETS - 2013



Source: Rubber Manufacturers Association

CEMENT INDUSTRY

- Current Position
 - Many kilns use TDF - 39 plants in 13 states
 - Others unlikely – public perception, logistics
 - Industry is rebounding from recession
 - Specific industry impact – oil/gas
 - Economics are shifting

CEMENT (continued)

- Projections
 - TDF usage dependent on production levels at existing kilns
 - TDF cost will be controlled by other alternative fuels, including fluff
 - Industry consolidation may impact some kilns and TDF usage
 - More use of shreds to maximize TDF usage
 - Future TDF consumption likely to be cyclical

CEMENT INDUSTRY IN COLORADO

- Cement Manufacturing Facilities
 - Holcim
 - GCC
 - CEMEX
- Historical and future cornerstone of expanded market growth, especially for use of at least one monofill
- Important, but not to the exclusion of market diversity

NON-HAZARDOUS SECONDARY MATERIALS RULE

- Defines which secondary material are, and are not solid wastes when burned for energy recovery
- Impacts application of CAA Section 112 regulations if NHSM or more rigorous CAA Section 129 solid waste incinerator regulations if solid waste.

PRACTICAL IMPACT

- Tires collected from on-going generation or from some managed amnesty programs are not a solid waste
- Tires that have been abandoned in stockpiles or monofills are solid waste unless processed with some reinforcing wire removal (even limited free wire liberated during shredding)
- This definition was upheld in court judgment issued about two weeks ago

PULP AND PAPER INDUSTRY

- Current Position
 - Many mills use TDF - 21 plants in 15 states
 - Industry has adjusted capacity to reflect mature US market with white paper and boxboard only strengths
 - Industry rebounding from recession, investing for future viability of mills
 - Regulatory impact from Boiler MACT and Clean Water rule implementation

PULP & PAPER (continued)

- Projections
 - Some gains and some losses from regulatory change
 - TDF pricing will be controlled by other fuels, with low gas and oil pricing impacting some regions
 - Smaller mills remain vulnerable to economic conditions and continuing market trends
 - Future TDF consumption likely to cycle at some mills as they adjust to regulatory changes.

PULP & PAPER INDUSTRY IN COLORADO

- NONE

POWER GENERATION

- Current Position
 - Very small % of power boilers use TDF- 25 facilities in 8 states
 - The market segments are diverse and are being impacted differently by regulatory and economic changes
 - Major gains include a large CFB boiler in Kentucky (up to 5 million tires/year) and several other potential major users
 - Major losses include the Oxford facility (10 million tires/year in Sterling, CT), biomass facilities in MI and several utility boilers
 - Resulting impact has been significant in some regions

POWER GENERATION

(continued)

- Market segments
 - TDF usage in MSW power units will increase for power generation if capacity is available.
 - TDF usage in renewable energy (biomass) facilities is being negatively impacted by economic incentives intended to promote wind and solar energy.
 - Low oil and natural gas prices are decreasing avoided cost revenue for merchant biomass power generation facilities.
 - Decreased energy tax credits for renewable energy power generation facilities also may have negative impact

POTENTIAL ACCELERATOR

- Greenhouse gas reporting rules continue to evolve.
- EPA recognizes conceptually that the natural rubber portion of tires is a renewable energy resource
- Under evolving Clean Air and Clean Power Plant rules, and related greenhouse gas reduction rules, use of TDF may receive greenhouse gas credits for renewable fraction.

POWER GENERATION IN COLORADO

- Generally fluidized bed, cyclone and some stoker-fired boilers
- All 19 identified large coal-burning units are unsuitable (wall and tangentially fired)
- Three small fluidized boilers have limited potential
- Biomass boilers can require supplemental energy for complete combustion, but changing economics and renewable energy regulatory status is detrimental

EXPORT

- Global energy markets and pricing have a significant impact in some regions
- Historical baled tire exports to China were disruptive to US waste tire industry in some regions, especially West and East Coasts
- Current exports of shredded tires represent a major market operating within the industry infrastructure primarily on West Coast, but vulnerable to global energy price fluctuations

Thank You

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