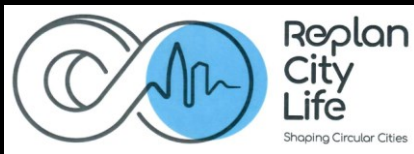


# RUBBERIZED BITUMEN IN EUROPE

## BETWEEN MYTHS AND REALITY

Costis Keridis ,Dipl.Ing. ETRA Vice President



RE-PLAN CITY LIFE project has received funding from the LIFE Programme of the European Union

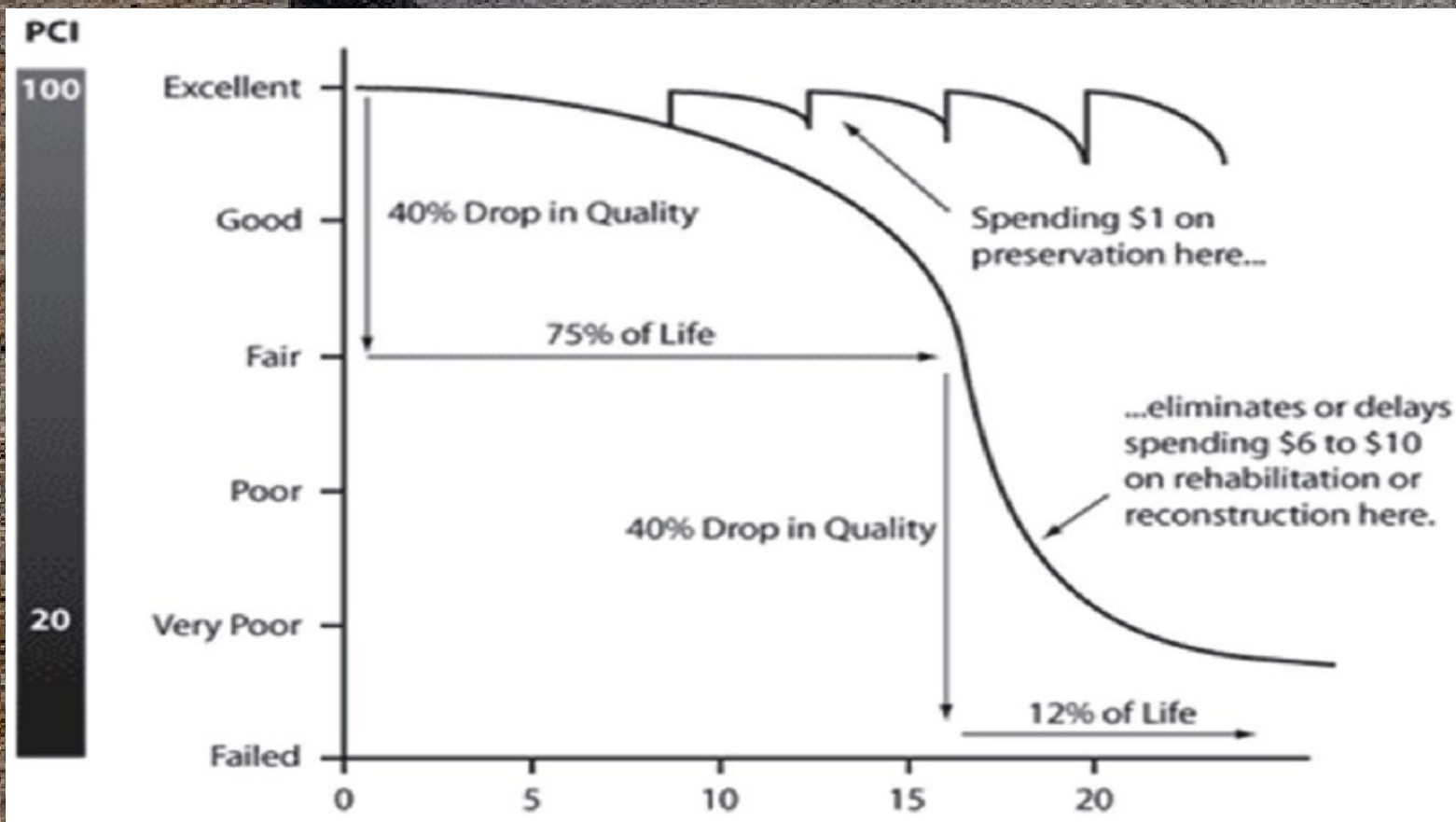


# WHY DO WE NEED MODIFIED BITUMEN?

- ✓ More rut resistant
  - ✓ More crack resistant
  - ✓ Smoother and quieter road surface
  - ✓ Less noise from traffic
  - ✓ Improve tyre traction
  - ✓ Reduce rainwater spray
  - ✓ **Reduce road maintenance cost**
-



# HYPOTHETICAL PAVEMENT DETERIORATION CURVE





# COMMON TYPES OF ASPHALT & BITUMEN MODIFIERS

- **Rubber** (Latex, Block Copolymer as SBS, **Reclaimed Rubber**)
- **Plastic** (Polyethylene/Polypropylene, EVA, PVC, EPDM)
- **Fibers** (Asbestos, Rock wool, Fiberglass, Polyester)
- **Antioxidant** (Carbon, Calcium Salts)
- **Hydrocarbon** (Recycled & Rejuvenating oils, Hard & Natural Asphalts as Trinidad Lake Asphalt)
- **Antistripping Agents** (Amines, Lime)
- **Recycled materials**



# ALMOST ALL KIND OF WASTE WERE TESTED AND USED IN ASPHALT PRODUCTION

- ✓ High density polyethylene
- ✓ Marble Quarry Waste
- ✓ Building Demolition Waste
- ✓ Tyres
- ✓ Cooking Oil
- ✓ Palm oil
- ✓ Fuel & Fly Ash
- ✓ Cellulose Fibers
- ✓ Polyester Fibers
- ✓ Sisal
- ✓ Starch
- ✓ Plastic bottles (PET)
- ✓ Waste Glass
- ✓ Waste Bricks
- ✓ Waste Ceramics
- ✓ Roofing shingles



# **RUBBERIZED ASPHALT IS AN ASPHALT MIX THAT HAS BEEN MODIFIED TO ALLOW THE ADDITION OF RECYCLED TYRE RUBBER**

Recycled rubber from truck and car tyres free of debris and steel/fibers, can be added :

- ✓ In the binder before mixing ( wet or terminal blend process )
- ✓ Like a fine aggregate during mixing ( dry process )

**5% rubber powder in bitumen binder**

**(it is not considered as modified)**

**equals to 555,000 tons of crumb rubber per year**











# RUBBERIZED BITUMEN MARKET

## Crumb Rubber Modified Bitumen Market

**Segment by Application** - Road, Roofing

**Segment by Type** - Wet Method, Dry Method

**By Company** - Hincol, Total, Repsol, Abhyudayam Energy, Raetex Doha, Baoli Group



M = millions and B = billions

Market Research



# **RUBBERIZED BITUMEN MAIN GLOBAL PLAYERS**

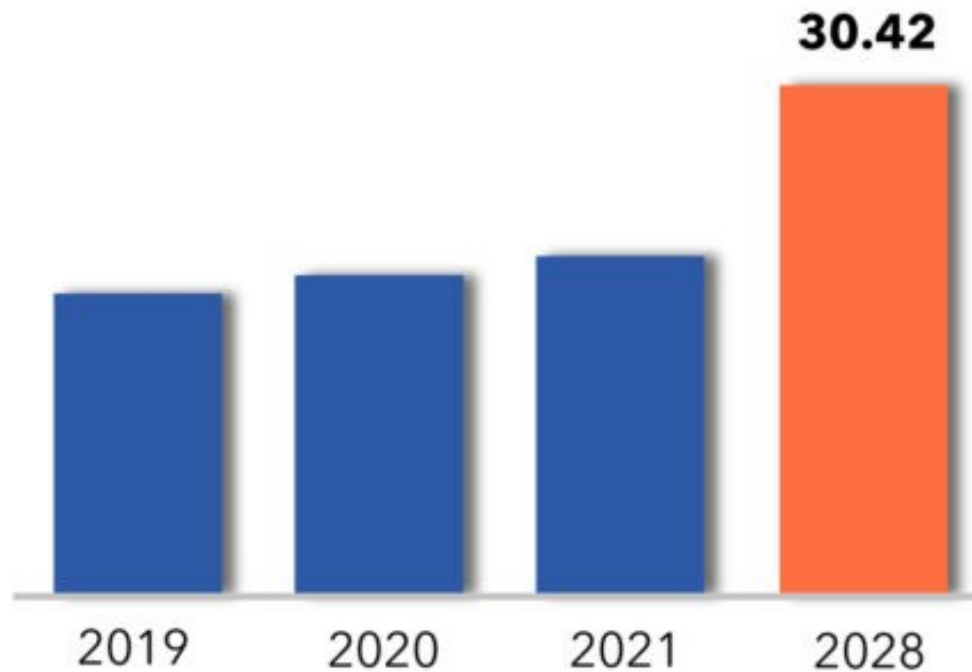
- **HINCOL (India)**
- **TOTAL (France)**
- **REPSOL (Spain)**
- **ABHYUDAYAM ENERGY (India)**
- **RAETEX DOHA (Qatar)**
- **BAOLI GROUP (China)**



# MODIFIED BITUMEN

## 2019-2028

Global Modified Bitumen Market, 2019-2028, in USD Billion



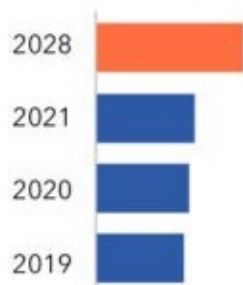


# MODIFIED BITUMEN MAIN GLOBAL PLAYERS

Modified Bitumen Market by Modifier Type, Application, End-use and Region,  
Global Trends and Forecast from 2019 to 2028



Market Size



Market is expected to grow faster in next decade.

**6%**

The environmental decisions around the globe will negatively affect the modified Bitumen market.

Rising demand for urbanisation throughout the globe is driving factor for bitumen market.

Developing countries such as Turkey, Indonesia, Vietnam and Brazil offers major growth opportunities to bitumen the market.



**33%** APAC



**Key Players**





# WHAT IS BETTER DILEMMA





# CONTRACTORS' MYTHS

- We will ruin bitumen storage tanks
- We need special equipment
- Viscosity testing procedure is standard
- Asphalt mix blend design cannot be varied
- Pavement cannot be performed during night



A large yellow and red roller is paving a road. The roller is moving from right to left, leaving a fresh, dark asphalt surface behind it. In the background, another roller is visible further down the road, and there are trees and utility poles on the left side. The sky is overcast.

# CONTRACTORS' REALITIES

- ✓ Increased mixing time ( almost 30% )
- ✓ Higher asphalt mix production temperatures
- ✓ Small projects have larger cost
- ✓ Application cost is similar to other modified mixes (SBS, ECA etc)
- ✓ Special care to maintain high temperatures





# **REALITIES USING RECYCLED TYRES IN ASPHALT**

- ✓ Increased resistance to deformation at higher pavement temperatures
- ✓ Improved adherence between aggregate and binder.
- ✓ Increased fatigue life
- ✓ Delayed cracking, and reflective cracking.
- ✓ Improved performance under adverse weather and heavy traffic circumstances.



A photograph of three female scientists in white lab coats working in a laboratory. They are gathered around a piece of scientific equipment, which appears to be a pendulum or a similar mechanical testing apparatus. The scientist in the foreground is looking down at a small object in her hands. The scientist in the middle is looking at the equipment. The scientist in the background is also looking at the equipment. The background shows a laboratory setting with various pieces of equipment and a poster on the wall.

# REALITIES USING RECYCLED TYRES IN ASPHALT

- ✓ Improved water resistance.
- ✓ Resistance to creep and increased indirect tensile strength.
- ✓ Reduced vulnerability to daily and seasonal temperature changes
- ✓ Reduce rainwater fogging
- ✓ Reduce traffic noise up to 3dB



# REALITIES FOR RECYCLED TYRE RUBBER IN BITUMEN

- ✓ Recyclable
- ✓ Cheaper than any other modifier
- ✓ Cheaper modification production process cost
- ✓ Same modification production equipment
- ✓ Same trucks and paving equipment
- ✓ Improved sustainability



# RUBBER IN BITUMEN : POTENTIAL

**Asphalt market is huge and could absorb large quantities of recycled rubber:**

- 1 Ton of Asphalt mix the binder is about 5% = 50 kg
- In **WET** Method we can use (mix) 5-20% rubber powder in the binder (between 2.5 to up 10 kg of rubber powder per ton of asphalt mix)
- 212.5 million tonnes of all asphalt mixes are produced In the EU-27 (E.A.P.A.2022), so they can be used from 531,125 to 2,122,000 tons of Rubber Powder

Even a minor addition of rubber powder in just the 10% of the EU asphalt market would allow to recycle 10% of the annual European post consumer tyre arising.



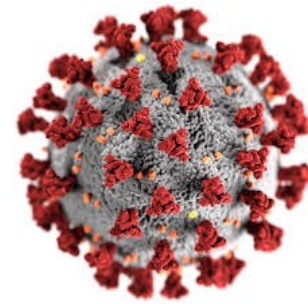
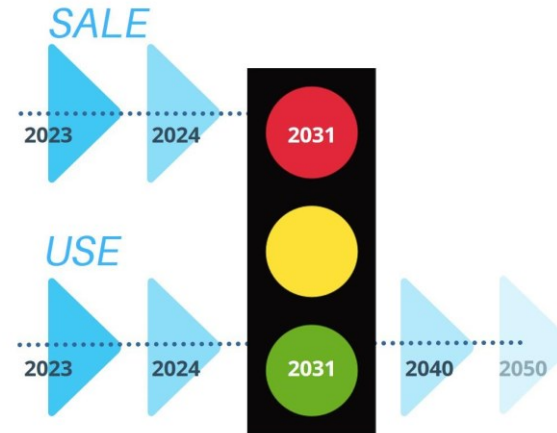
# OBSTACLES

- ◆ Public sector engineers with insufficient awareness and experience
- ◆ Delayed implementation of environmental criteria in GPP
- ◆ Limited relative information in Civil Engineering Universities
- ◆ Lack of a European user-friendly database
- ◆ Limited trust in recycled materials performance (in general)





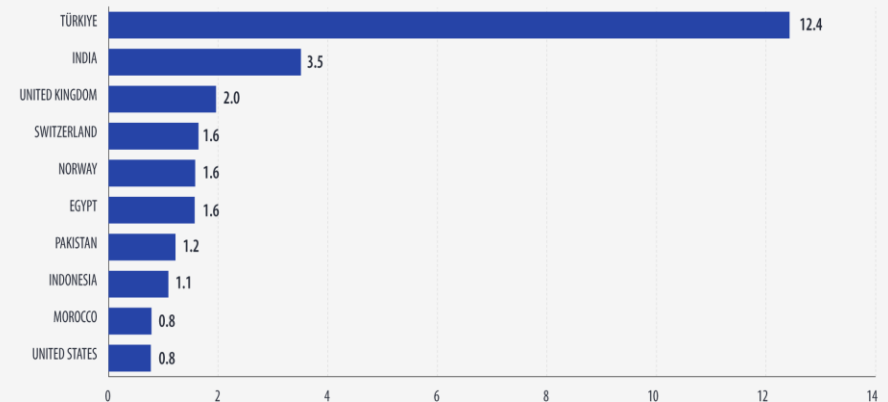
## INFILL BAN



# OPPORTUNITIES

## Top 10 main destinations of waste from the EU in 2022

(million tonnes)





# RE-PLAN CITY LIFE project aims to:

- ✓ raise awareness about the Circular Economy opportunities for **materials**, **products** and **applications** obtained from tyre recycling
- ✓ adopt environmentally friendly behavior and practice in urban communities.

Promoting the use of Rubberized Asphalt is one of our commitments



**ATTENTION**

**THANK YOU FOR  
YOUR ATTENTION**





**+30 6944 145 556    INFO @KERIDIS.COM**