



# 2ND INTERNATIONAL SYMPOSIUM K-FORCE 2019

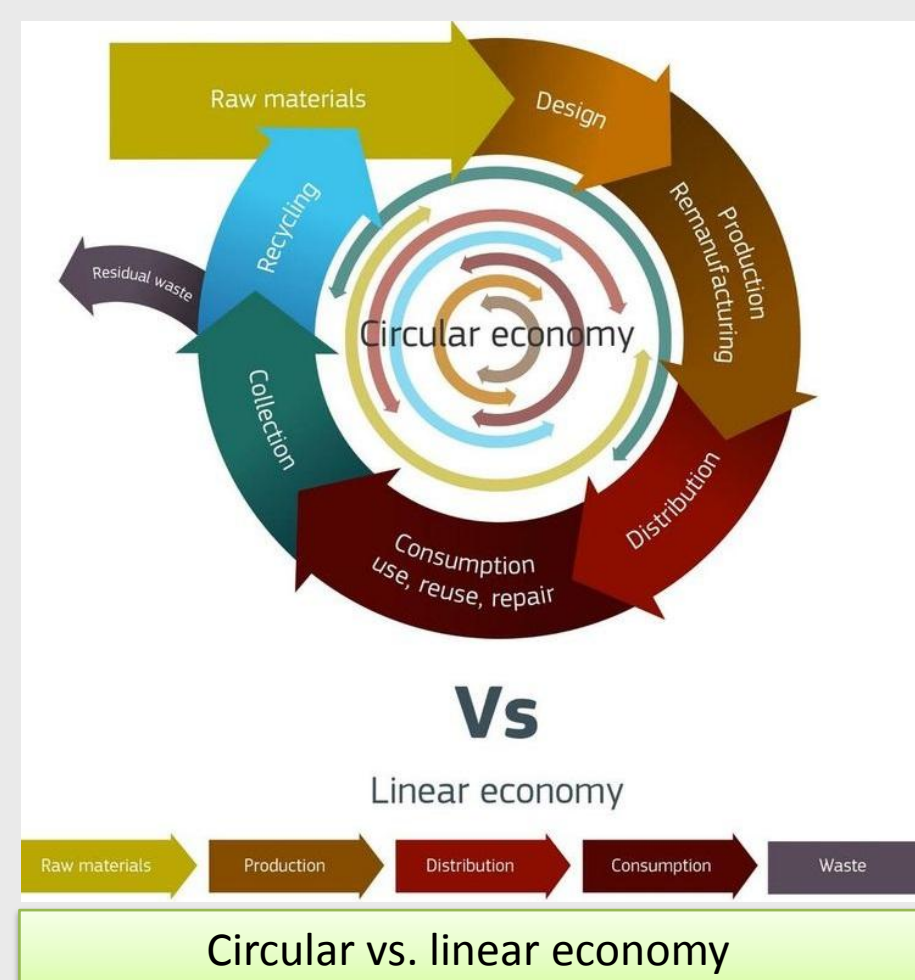
Tirana, September 9, 2019

## THE USE OF BIOMASS ASH IN THE CONSTRUCTION INDUSTRY AS A WAY TOWARDS A CIRCULAR ECONOMY

### INTRODUCTION

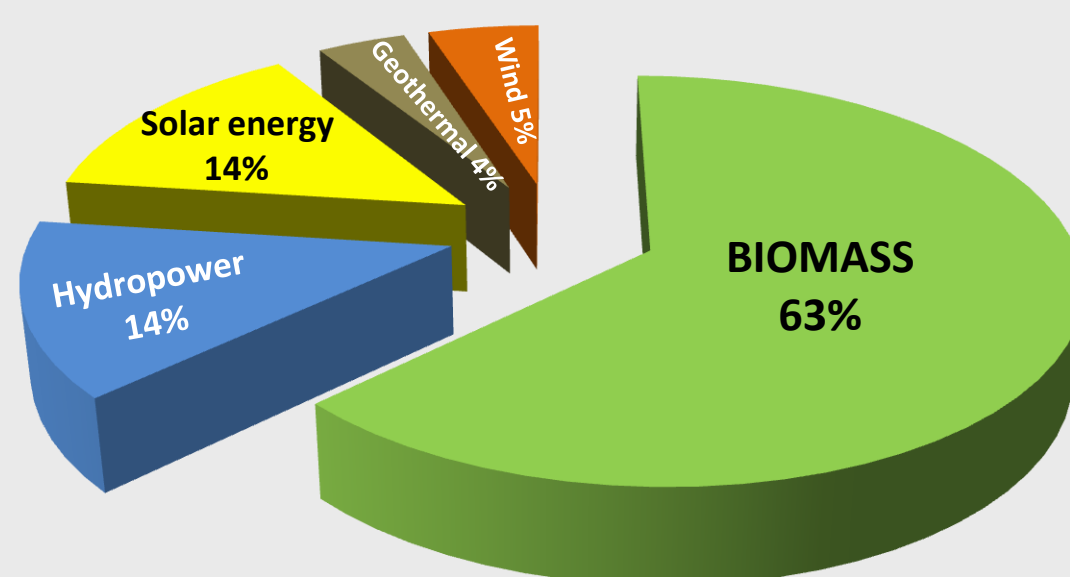
A Circular Economy is a regenerative system that replaces the 'end-of-life' concept with 'cradle to cradle' design concept which involves the safe and potentially infinite use of materials. The increase in demand for construction materials, derived as a consequence of urban industrialization has called for an alternative way to develop materials from different sources. A number of investigations have demonstrated the validity of using waste materials from technical, environmental and economical reasons. The same principle can be applied to biomass ashes.

### CORE IDEA OF THE RESEARCH



The possibilities of application of different wastes in the production of building materials			
No.	Name of waste	Type of waste	Use in construction industry
1	✓ fly ash ✓ <b>biomass ash</b> ✓ organic fibres ✓ bottom ash	agro-industrial	✓ aggregate ✓ concrete ✓ SCM ✓ bricks, blocks, tiles ✓ wall panels, roof sheets
2	✓ phospho-gypsum ✓ waste glass ✓ slag ✓ rubber tire	industrial	✓ aggregate ✓ concrete ✓ blended cement ✓ bricks, blocks, tiles ✓ ceramic products
3	✓ quarry dust	mining/mineral	✓ aggregate ✓ concrete ✓ bricks, blocks, tiles
4	✓ C&D waste (concrete rubble, waste bricks..)	industrial	✓ aggregate ✓ concrete ✓ bricks, blocks

### Renewable energy sources in Serbia



The annual production of **biomass waste** in Vojvodina is around **9 million tons**, and **13 million tons** in Serbia



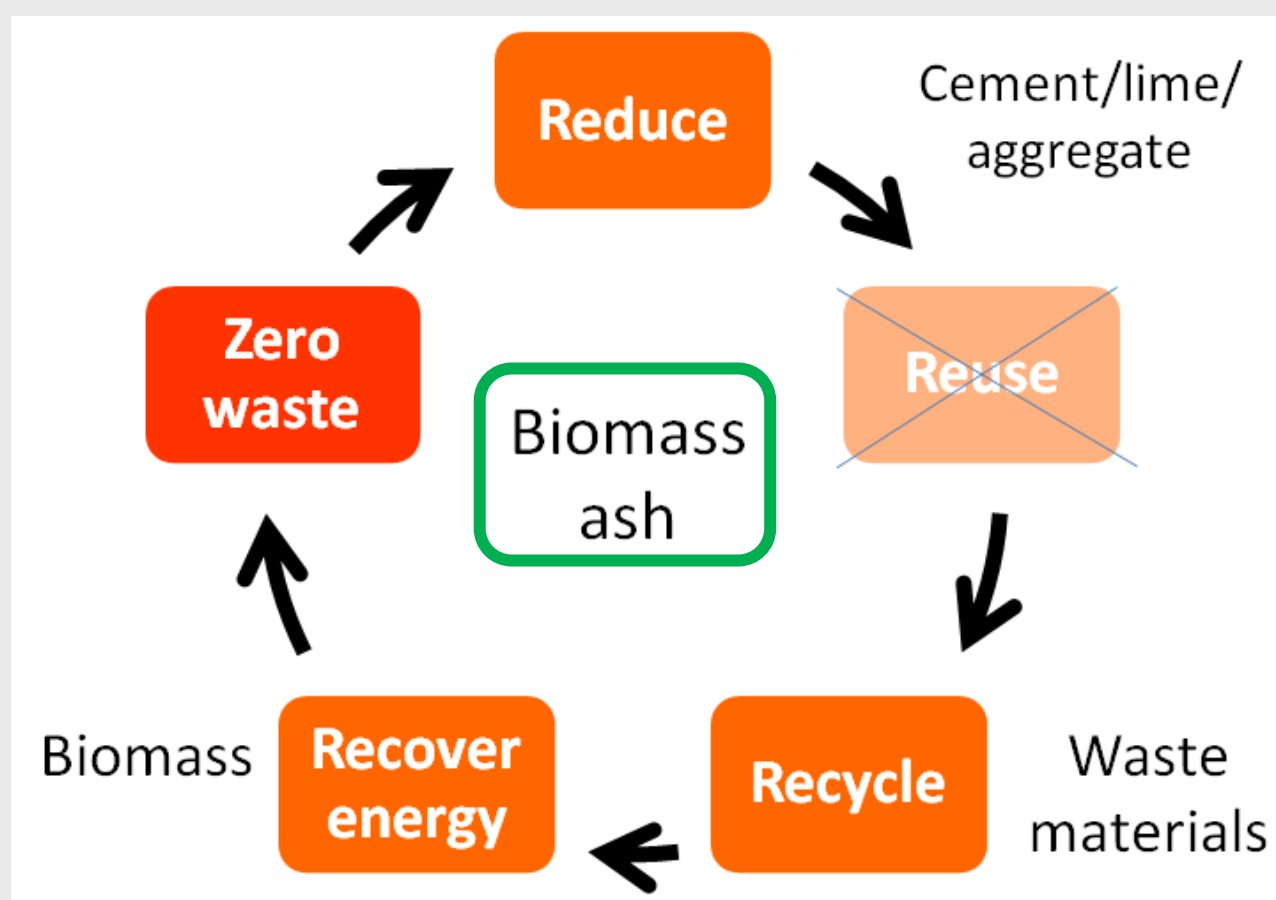
residues



biomass ashes

biomass

waste



### The possibilities of application of different biomass wastes as building materials

Biomass ash	Application	Effects of substitution
rice husk ash	SCM (mortar, concrete)	improved mechanical and durability properties
oil palm shell	lightweight aggregate	high strength lightweight concrete
oyster shell ash	lime	a lower carbon footprint
sugarcane bagasse ash	SCM (concrete)	lower permeability, increased resistance to chloride corrosion
coconut shell	coarse aggregate	structural lightweight concrete
wheat straw ash	SCM (mortar)	cement substitution of 50% without compromising mechanical properties
sugarcane biomass ash	mineral additive	25% replacement level of cement in producing sustainable concrete - an optimum replacement
tobacco waste	lightweight aggregate	low thermal conductivity lightweight concrete
wood waste ash	mineral additive	cement replacement up to 10% by total binder weight can produce structural grade concrete or mortar
sewage sludge ash	mineral additive	20% addition to a mortar and concrete mixture provides 80% of the strength of the control mortar and concrete

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