

BIO-QUESTIONS cards - Educational board game

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Created by: APRE, Agency for the Promotion of European Research

Technical contribution: AIJU, Technological Institute for children's products and leisure

Scientific validation by: BTG Biomass Technology Group B.V.

Copyright Note

The game is considered validated **and under APRE's ownership** in its contents but not in its visual elements. The visual prototype (wireframe) has been used to conduct the various steps of the validation process in order to collect additional data for its replication in other educational contexts. We underline that the draft provided is only a model and that it will not be replicated in the final graphics. In the future we will proceed with the conception, validation and creation of the final product complete with all its visual components. Any feedback from using the game will be helpful to our validation process. Thanking you for your help, we ask you to contact us at the following email: genb@apre.it

This material reflects only the author's views. The European Commission is not responsible for any use that may be made of the information it contains.

ACKNOWLEDGEMENTS

The GenB Educational game has been reviewed from both scientific-technical and educational perspectives, ensuring their quality and appropriateness for the target audience.

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This document details the formulas for various bio-based products that can be manufactured from 12 different types of biomasses found in 4 different environments.

12 TOTAL BIOMASSES

The biomasses are divided by environments because, if you play the PRO version of the game, you need to complete a formula for each environment to have the chance to end the game.

- 3 biomasses for the "**Countryside**" environment; Wine Production Waste, Hemp, Tomato Scraps
- 3 biomasses for the "**City**" Environment; Apple Scraps, Pruning Waste, Coffee Grounds (City)
- 3 biomasses for the "**Forest**" Environment; Bamboo, Wood Scraps, Mushrooms
- 3 biomasses for the "**Sea**" environment; Posidonia, Spirulina, and Fishery waste

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MAX 7 FORMULAS PER SINGLE BIOMASS

From each type of biomass (from waste or not), up to 7 different bio-based products (Bio-Products), representing a range of product categories/applications, can be manufactured.

ALTERNATIVE BIOMASSES

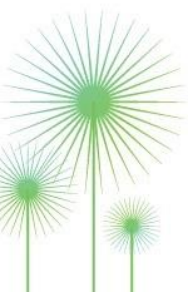
The Card will also indicate alternative biomasses from which the same bio-based product can be manufactured (to give a broader overview).

Grape pomace Waste (Countryside)

Cut the Product cards along the edges

PRODUCT	PRODUCT
<p><u>Watercolours</u></p> <p>Wine Production Waste + 4 Energy Units</p> <p>1 Sustainability Point</p> <p>Objects – Paints & Coatings</p>	<p><u>Cooking Oil</u></p> <p>Wine Production Waste + 4 Energy Units</p> <p>1 Sustainability Points</p> <p>Oils – Foods & Drinks</p>
<p><u>Food Supplements</u></p> <p>Wine Production Waste + 4 Energy Units</p> <p>1 Sustainability Point</p> <p>Supplements – Supplements & Additives</p>	<p><u>Eco-leather Jacket</u></p> <p>Wine Production Waste + 7 Energy Units</p> <p>2 Sustainability Points</p> <p>Eco-leather – Clothing, Shoes & Accessories</p>

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<p><u>Notebook</u></p> <p>Wine Production Waste + 7 Energy Units</p> <p>2 Sustainability Points</p> <p>Paper – Paper products</p>	<p><u>Biofuels</u></p> <p>Wine Production Waste + 10 Energy Units</p> <p>3 Sustainability Points</p> <p>Biofuels – Energy products</p>
<p><u>Plant Fertilizer</u></p> <p>Wine Production Waste + 7 Energy Units</p> <p>2 Sustainability Points</p> <p>Compost – Nutrients/fertilisers</p>	

Hemp (Countryside)

Cut the Product cards along the edges

PRODUCT	PRODUCT
<p><u>Supplement</u></p> <p>Hemp + 7 Energy Units</p> <p>2 Sustainability Points</p> <p>Supplements – Supplements & Additives</p>	<p><u>Thermal Insulation</u></p> <p>Hemp + 7 Energy Units</p> <p>2 Sustainability Points</p> <p>Building Materials – Building Materials</p>
<p><u>Bio-based plastic Water Bottle</u></p> <p>Hemp + 10 Energy Units</p> <p>3 Sustainability Points</p> <p>Objects – Packaging materials</p>	<p><u>Scarf</u></p> <p>Hemp + 4 Energy Units</p> <p>1 Sustainability Point</p> <p>Fabrics – Clothing, Shoes & Accessories</p>

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<p><u>Pasta</u></p> <p>Hemp + 7 Energy Units</p> <p>2 Sustainability Points</p> <p>Food – Foods & Drinks</p>	<p><u>Healing Oil</u></p> <p>Hemp + 7 Energy Units</p> <p>2 Sustainability Points</p> <p>Oils – Home, Beauty and Personal Care Products</p>
<p><u>Notebook</u></p> <p>Hemp + 4 Energy Units</p> <p>1 Sustainability Point</p> <p>Paper – Paper products</p>	

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Tomato Scraps (Countryside)

Cut the Product cards along the edges

PRODUCT	PRODUCT
<p><u>Cosmetics</u></p> <p>Tomato Scraps + 7 Energy Units</p> <p>2 Sustainability Points</p> <p>Cosmetics – Home, Beauty and Personal Care Products</p>	<p><u>Pharmaceutical Compound</u></p> <p>Tomato Scraps + 10 Energy Units</p> <p>3 Sustainability Points</p> <p>Medicines – Medicines & Pharmaceuticals</p>
<p><u>Bio Varnish</u></p> <p>Tomato Scraps + 7 Energy Units</p> <p>2 Sustainability Points</p> <p>Objects – Paints & Coatings</p>	<p><u>Protective Lacquers for coating the inside of Metal Food Containers</u></p> <p>Tomato Scraps + 10 Energy Units</p> <p>3 Sustainability Points</p> <p>Objects – Paints & Coatings</p>
<p><u>Watercolors</u></p> <p>Tomato Scraps + 4 Energy Units</p> <p>1 Sustainability Points</p> <p>Objects – Paints & Coatings</p>	<p><u>Bio-based plastic Bags</u></p> <p>Tomato Scraps + 7 Energy Units</p> <p>2 Sustainability Points</p> <p>Objects – Packaging materials</p>

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<p><u>Food Additives</u></p> <p>Tomato Scraps + 4 Energy Units</p> <p>1 Sustainability Point</p> <p>Objects – Supplements & Additives</p>	
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Apple Scraps (City)

Cut the Product cards along the edges

PRODUCT	PRODUCT
<p><u>Drawing Sheets</u></p> <p>Apple Scraps + 4 Energy Units</p> <p>1 Sustainability Point</p> <p>Paper – Paper products</p>	<p><u>Bio-based plastic Vase</u></p> <p>Apple Scraps + 7 Energy Units</p> <p>2 Sustainability Points</p> <p>Objects – Room decoration</p>
<p><u>Eco-leather Handbag</u></p> <p>Apple Scraps + 10 Energy Units</p> <p>3 Sustainability Points</p> <p>Objects – Clothing, Shoes & Accessories</p>	<p><u>Food Packaging</u></p> <p>Apple Scraps + 7 Energy Units</p> <p>2 Sustainability Points</p> <p>Paper – Packaging materials</p>
<p><u>Eco-leather Sneakers</u></p> <p>Apple Scraps + 10 Energy Units</p> <p>3 Sustainability Points</p> <p>Objects – Clothing, Shoes & Accessories</p>	<p><u>Toilet Paper</u></p> <p>Apple Scraps + 7 Energy Units</p> <p>2 Sustainability Points</p> <p>Paper – Paper products</p>

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Supplement

Apple Scraps + 4 Energy Units

1 Sustainability Point

Supplements – Supplements & Additives

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Pruning Waste (City)

Cut the Product cards along the edges

PRODUCT	PRODUCT
<p><u>Biofuel</u></p> <p>Pruning Waste + 10 Energy Units</p> <p>3 Sustainability Points</p> <p>Biofuels – Energy products</p>	<p><u>Plant Fertilizer</u></p> <p>Pruning Waste + 7 Energy Units</p> <p>2 Sustainability Points</p> <p>Compost – Nutrients/fertilisers</p>
<p><u>Thermal Insulation</u></p> <p>Pruning Waste + 10 Energy Units</p> <p>3 Sustainability Points</p> <p>Building Materials – Building Materials</p>	<p><u>Confetti</u></p> <p>Pruning Waste + 7 Energy Units</p> <p>2 Sustainability Points</p> <p>Paper – Paper products</p>
<p><u>Socks</u></p> <p>Pruning Waste + 10 Energy Units</p> <p>3 Sustainability Points – Fabrics Clothing, Shoes & Accessories</p> <p>Fabrics – Clothing, Shoes & Accessories</p>	<p><u>Gift Wrapping Paper</u></p> <p>Pruning Waste + 4 Energy Units</p> <p>1 Sustainability Point</p> <p>Paper – Paper products</p>
<p><u>Panels</u></p> <p>Pruning Waste + 4 Energy Units</p> <p>1 Sustainability Point</p> <p>Building Materials – Building Materials</p>	

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Coffee Grounds (City)

Cut the Product cards along the edges

PRODUCT	PRODUCT
<p><u>Notebook</u></p> <p>Coffee Grounds + 4 Energy Units</p> <p>1 Sustainability Point</p> <p>Paper – Paper products</p>	<p><u>Fertilizer for Mushrooms</u></p> <p>Coffee Grounds + 10 Energy Units</p> <p>3 Sustainability Points</p> <p>Compost – Nutrients/fertilisers</p>
<p><u>Technical Sports T-shirt</u></p> <p>Coffee Grounds + 7 Energy Units</p> <p>2 Sustainability Points</p> <p>Fabrics – Clothing, Shoes & Accessories</p>	<p><u>Coffee Cup</u></p> <p>Coffee Grounds + 10 Energy Units</p> <p>3 Sustainability Points</p> <p>Objects – Kitchen products</p>
<p><u>Biofuel</u></p> <p>Coffee Grounds + 10 Energy Units</p> <p>3 Sustainability Points</p> <p>Biofuels – Energy products</p>	<p><u>Pen</u></p> <p>Coffee Grounds + 10 Energy Units</p> <p>3 Sustainability Points</p> <p>Objects Office supplies</p>
<p><u>Air Freshener</u></p> <p>Coffee Grounds + 4 Energy Units</p> <p>1 Sustainability Point</p> <p>Objects – Home, Beauty and Personal Care Products</p>	

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Bamboo (Forest)

Cut the Product cards along the edges

PRODUCT	PRODUCT
<p><u>Gloves</u></p> <p>Bamboo + 10 Energy Units</p> <p>3 Sustainability Points</p> <p>Fabrics – Clothing, Shoes & Accessories</p>	<p><u>Supplement</u></p> <p>Bamboo + 4 Energy Units</p> <p>1 Sustainability Point</p> <p>Supplements – Supplements & Additives</p>
<p><u>Deodorant</u></p> <p>Bamboo + 7 Energy Units</p> <p>2 Sustainability Points</p> <p>Cosmetics – Home, Beauty and Personal Care Products</p>	<p><u>Flooring</u></p> <p>Bamboo + 7 Energy Units</p> <p>2 Sustainability Points</p> <p>Building Materials – Building Materials</p>
<p><u>3D Puzzle</u></p> <p>Bamboo + 10 Energy Units</p> <p>3 Sustainability Points</p> <p>Objects – Toys & Games</p>	<p><u>Guitar</u></p> <p>Bamboo + 10 Energy Units</p> <p>3 Sustainability Points</p> <p>Objects – Sports & Music</p>
<p><u>Toothbrush</u></p> <p>Bamboo + 4 Energy Units</p> <p>1 Sustainability Point</p> <p>Objects – Home, Beauty and Personal Care Products</p>	

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Wood Scraps (Forest)

Cut the Product cards along the edges

PRODUCT	PRODUCT
<p><u>Pants</u></p> <p>Wood Scraps + 10 Energy Units</p> <p>3 Sustainability Points</p> <p>Fabrics – Clothing, Shoes & Accessories</p>	<p><u>Crutches</u></p> <p>Wood Scraps + 10 Energy Units</p> <p>3 Sustainability Points</p> <p>Liquid Wood – t.b.d.</p>
<p><u>Thermal Insulation</u></p> <p>Wood Scraps + 10 Energy Units</p> <p>3 Sustainability Points</p> <p>Building Materials – Building Materials</p>	<p><u>Cat Litter</u></p> <p>Wood Scraps + 7 Energy Units</p> <p>2 Sustainability Points</p> <p>Objects – Animal Food & Care</p>
<p><u>Biofuels</u></p> <p>Wood Scraps + 10 Energy Units</p> <p>3 Sustainability Points</p> <p>Biofuels – Energy products</p>	<p><u>Pharmaceutical Compound</u></p> <p>Wood Scraps + 10 Energy Units</p> <p>3 Sustainability Points</p> <p>Medicines – Medicines & Pharmaceuticals</p>
<p><u>Freight Transport Support (Pallet)</u></p> <p>Wood Scraps + 4 Energy Units</p> <p>1 Sustainability Point</p> <p>Objects – Transport & Shipping</p>	

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Mushrooms (Forest)

Cut the Product cards along the edges

PRODUCT	PRODUCT
<p><u>Packaging Material</u></p> <p>Mushrooms + 7 Energy Units</p> <p>2 Sustainability Points</p> <p>Objects – Packaging materials</p>	<p><u>Bricks</u></p> <p>Mushrooms + 7 Energy Units</p> <p>2 Sustainability Points</p> <p>Building Materials – Building Materials</p>
<p><u>Eco-leather Belt</u></p> <p>Mushrooms + 4 Energy Units</p> <p>1 Sustainability Point</p> <p>Eco-leather – Clothing, Shoes & Accessories</p>	<p><u>Plant Fertilizer</u></p> <p>Mushrooms + 7 Energy Units</p> <p>2 Sustainability Points</p> <p>Compost – Nutrients/fertilisers</p>
<p><u>Supplements</u></p> <p>Mushrooms + 4 Energy Units</p> <p>1 Sustainability Point</p> <p>Supplements – Supplements & Additives</p>	<p><u>Biofuels</u></p> <p>Mushrooms + 10 Energy Units</p> <p>3 Sustainability Points</p> <p>Biofuels – Energy products</p>
<p><u>Biodegradable-Interred Vases</u></p> <p>Mushrooms + 7 Energy Units</p> <p>2 Sustainability Points</p> <p>Objects – Room decoration</p>	

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Posidonia (Sea)

Cut the Product cards along the edges

PRODUCT	PRODUCT
<p><u>Cosmetics</u></p> <p>Posidonia + 7 Energy Units</p> <p>2 Sustainability Points</p> <p>Cosmetics – Home, Beauty and Personal Care Products</p>	<p><u>Pharmaceutical Compound</u></p> <p>Posidonia + 10 Energy Units</p> <p>3 Sustainability Points</p> <p>Pharmaceuticals – Medicines & Pharmaceuticals</p>
<p><u>Grocery Bag</u></p> <p>Posidonia + 10 Energy Units</p> <p>3 Sustainability Points</p> <p>Objects – Packaging materials</p>	<p><u>Plant Fertilizer</u></p> <p>Posidonia + 7 Energy Units</p> <p>2 Sustainability Points</p> <p>Compost – Nutrients/ fertilisers</p>
<p><u>Biofuels</u></p> <p>Posidonia + 10 Energy Units</p> <p>3 Sustainability Points</p> <p>Biofuels – Energy products</p>	<p><u>Insulating Material</u></p> <p>Posidonia + 7 Energy Units</p> <p>2 Sustainability Points</p> <p>Building Materials – Building Materials</p>
<p><u>Carpet</u></p> <p>Posidonia + 4 Energy Units</p> <p>1 Sustainability Point</p> <p>Objects – Room decoration</p>	

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Spirulina (Sea)

Cut the Product cards along the edges

PRODUCT	CATEGORY	SPECIFIC CATEGORY
<p><u>Face cream</u></p> <p>Spirulina + 7 Energy Units</p> <p>2 Sustainability Points</p> <p>Cosmetics – Home, Beauty and Personal Care Products</p>	<p><u>Supplement</u></p> <p>Spirulina + 4 Energy Units</p> <p>1 Sustainability Point</p> <p>Supplements – Supplements & Additives</p>	
<p><u>Cellphone cover</u></p> <p>Spirulina + 10 Energy Units</p> <p>3 Sustainability Points</p> <p>Objects – t.b.d.</p>	<p><u>Pasta</u></p> <p>Spirulina + 4 Energy Units</p> <p>1 Sustainability Point</p> <p>Food – Foods & Drinks</p>	
<p><u>Biofuels</u></p> <p>Spirulina + 10 Energy Units</p> <p>3 Sustainability Points</p> <p>Biofuels – Energy products</p>	<p><u>Animal feed</u></p> <p>Spirulina + 4 Energy Units</p> <p>1 Sustainability Point</p> <p>Food – Animal Food & Care</p>	
<p><u>Lamp stand</u></p> <p>Spirulina + 7 Energy Units</p> <p>2 Sustainability Points</p> <p>Objects – Room decoration</p>		

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Fishery waste (Sea)

Cut the Product cards along the edges

PRODUCT	PRODUCT
<p><u>Sunscreen</u></p> <p>Fishery waste + 7 Energy Units</p> <p>2 Sustainability Points</p> <p>Cosmetics – Home, Beauty and Personal Care Products</p>	<p><u>Supplement</u></p> <p>Fishery waste + 4 Energy Units</p> <p>1 Sustainability Point</p> <p>Supplements – Supplements & Additives</p>
<p><u>Wallet</u></p> <p>Fishery waste+ 10 Energy Units</p> <p>3 Sustainability Points</p> <p>Eco-leather – t.b.d.</p>	<p><u>Plant fertilizer</u></p> <p>Fishery waste + 7 Energy Units</p> <p>2 Sustainability Points</p> <p>Compost – Nutrients/fertilisers</p>
<p><u>Bricks</u></p> <p>Fishery waste + 7 Energy Units</p> <p>2 Sustainability Points</p> <p>Building Material – Building Materials</p>	<p><u>Bioreef-artificial reefs</u></p> <p>Fishery waste + 7 Energy Units</p> <p>2 Sustainability Points</p> <p>Building Material – Building Materials</p>
<p><u>Packaging material</u></p> <p>Fishery waste + 7 Energy Units</p> <p>2 Sustainability Points</p> <p>Objects – Packaging materials</p>	

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