

Circular Scan in Prague

Vojtěch Vosecký | Institut Cirkulární Ekonomiky
CAMP, 31st May, 2019



An aerial photograph of a crowded beach. The ocean is on the left, with waves breaking onto the shore. The beach is filled with people, many of whom are sitting on towels or blankets. There are several blue umbrellas and white beach chairs scattered throughout the crowd. The text is overlaid on a white rectangular background in the center of the image.

“In 2050, global demand for resources will be triple of what the planet is able to provide sustainably.” (Rockstrom et al.2009)

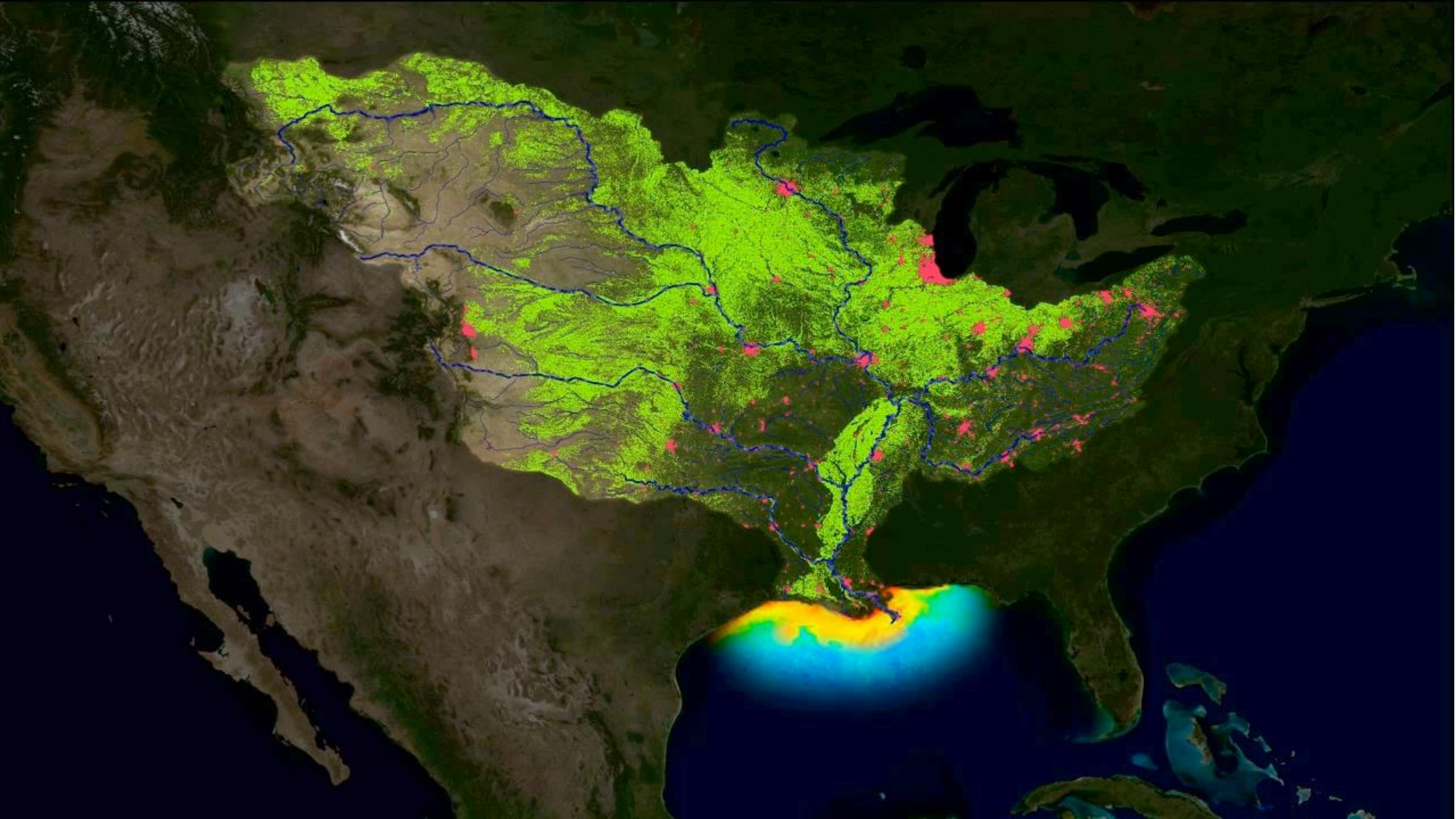


“2,5 billion tons of waste / year in the EU.

***50% ends up on the landfills or incinerated.”
(European Parliament, 2016).***

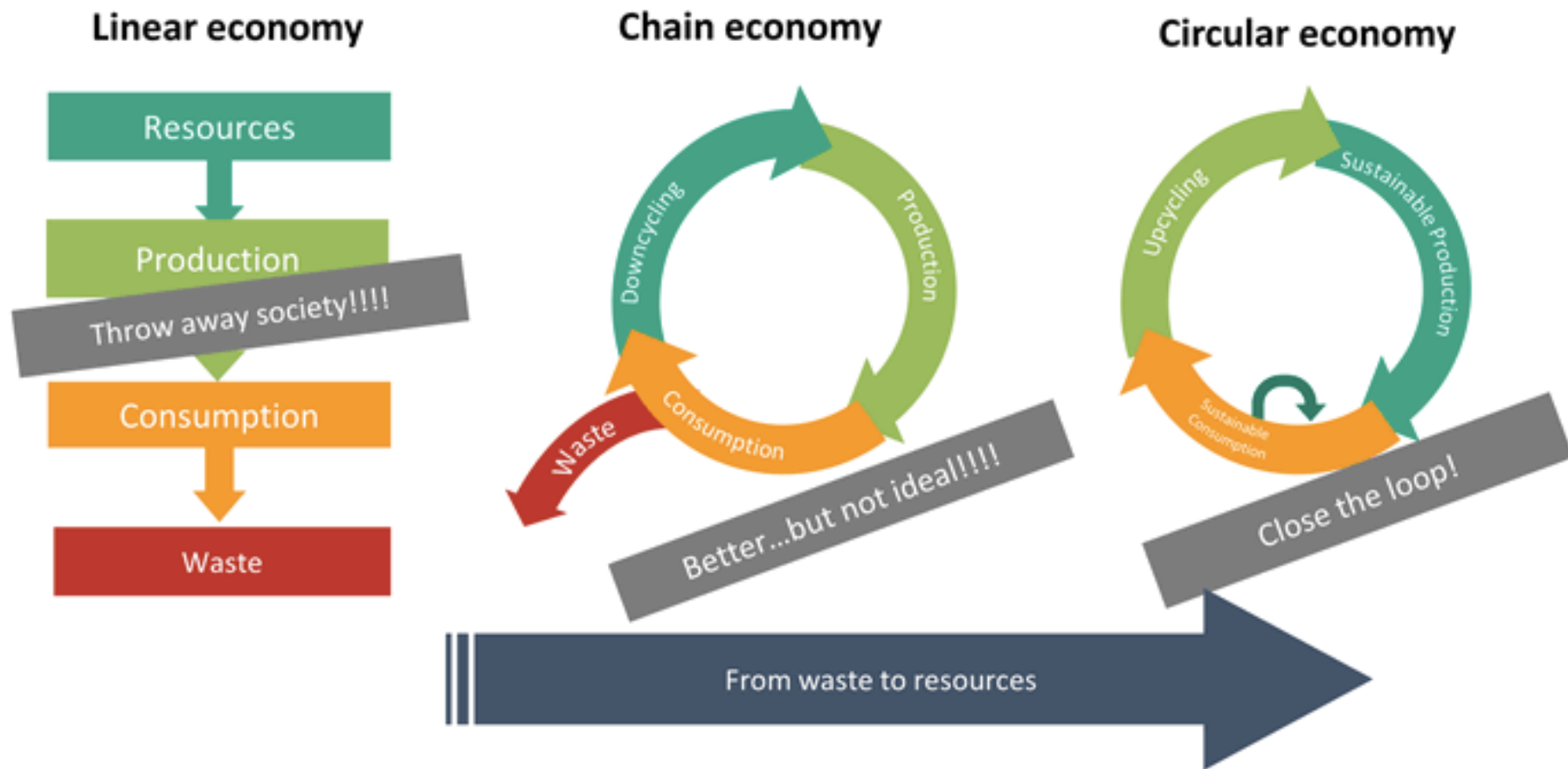
A wide-angle photograph of a phosphate mining site. In the foreground, a large, deep pit is filled with reddish-brown earth and grey rock. A massive conveyor system, consisting of several long, white metal structures supported by cables, extends across the sky from the left towards the right. A large white and green conveyor structure is visible on the right side, with the word "osaic" partially visible on its side. The sky is a clear, bright blue with a few wispy clouds. The overall scene depicts a large-scale industrial mining operation.

„Within 100 years, we will run out of phosphate fertilisers.“ (EC, 2017)



CIRCULAR ECONOMY

From Waste To Resources...



CITIES

50%

GLOBAL POPULATION

80%

GLOBAL GDP

2/3

ENERGY DEMAND

70%

RESOURCE CONSUMPTION





GOVERNMENT
-
PUBLIC SPHERE
-
NGO'S

MUNICIPALITIES



INSTITUT
CIRKULÁRNÍ
EKONOMIKY

BUSINESS

CITIZENS

CIRCULAR SCAN PRAGUE

*Transitioning to circular economy
in cities*

ABOUT THE PROJECT

GOAL: TOGETHER WITH CITY DECISION MAKERS, CREATE A CLEAR, COMPELING AND A REALISTIC VISION OF CIRCULAR PRAGUE

APPROACH: BASED ON MAPPING THE LOCAL AGENDA, MATERIAL FLOWS, AND DOZENS OF INTERVIEWS WITH COMPANIES, EXPERTS AND BURREAUCRATS, PROPOSE A SEVERAL AMBITIOUS PILOT PROJECTS



CIRCLE CITY SCAN: PHASES



Socio economic
analysis



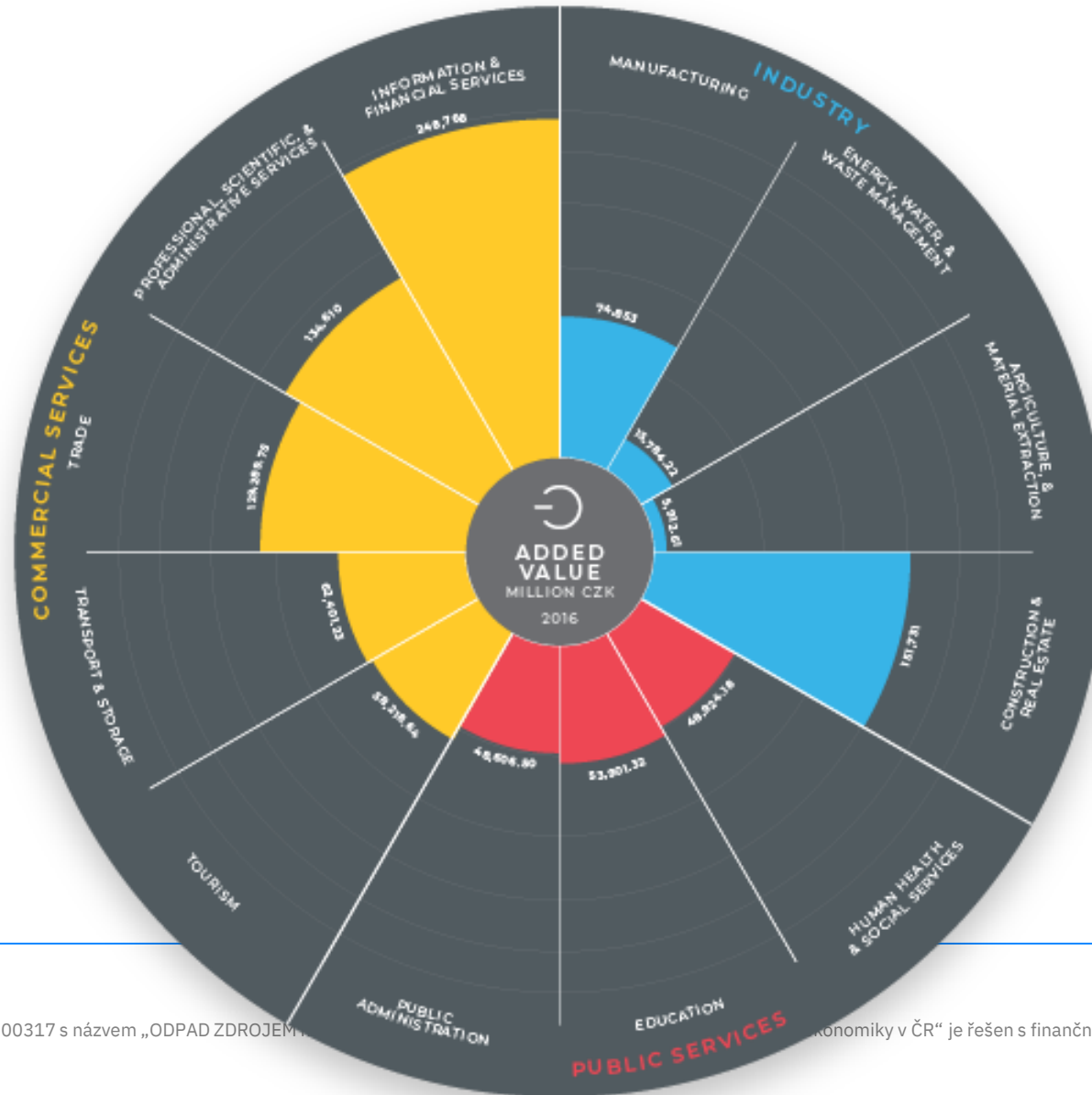
Material flow *and*
opportunity mapping



Action plan



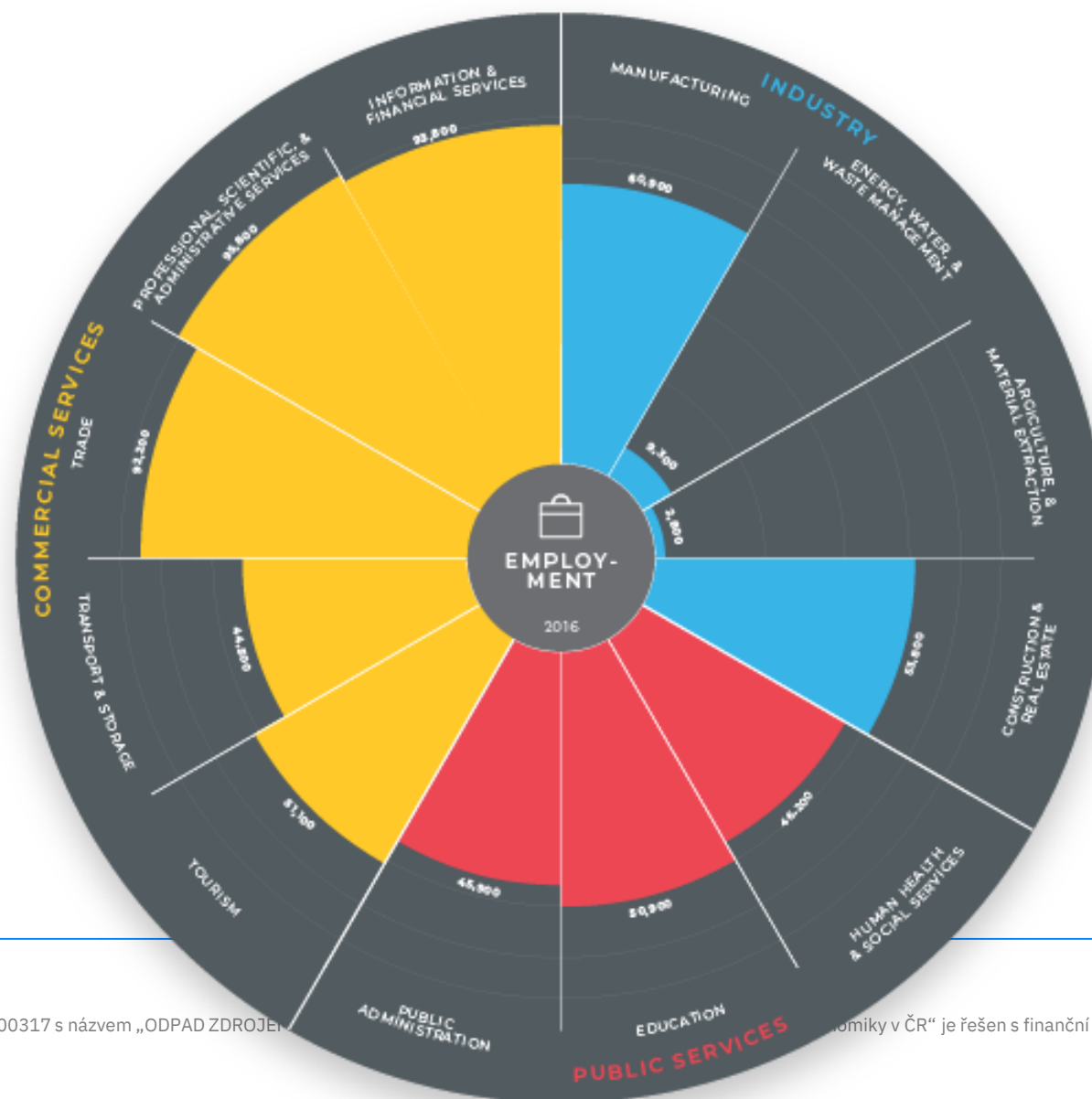
PHASE 1: ECONOMIC ANALYSIS – added value



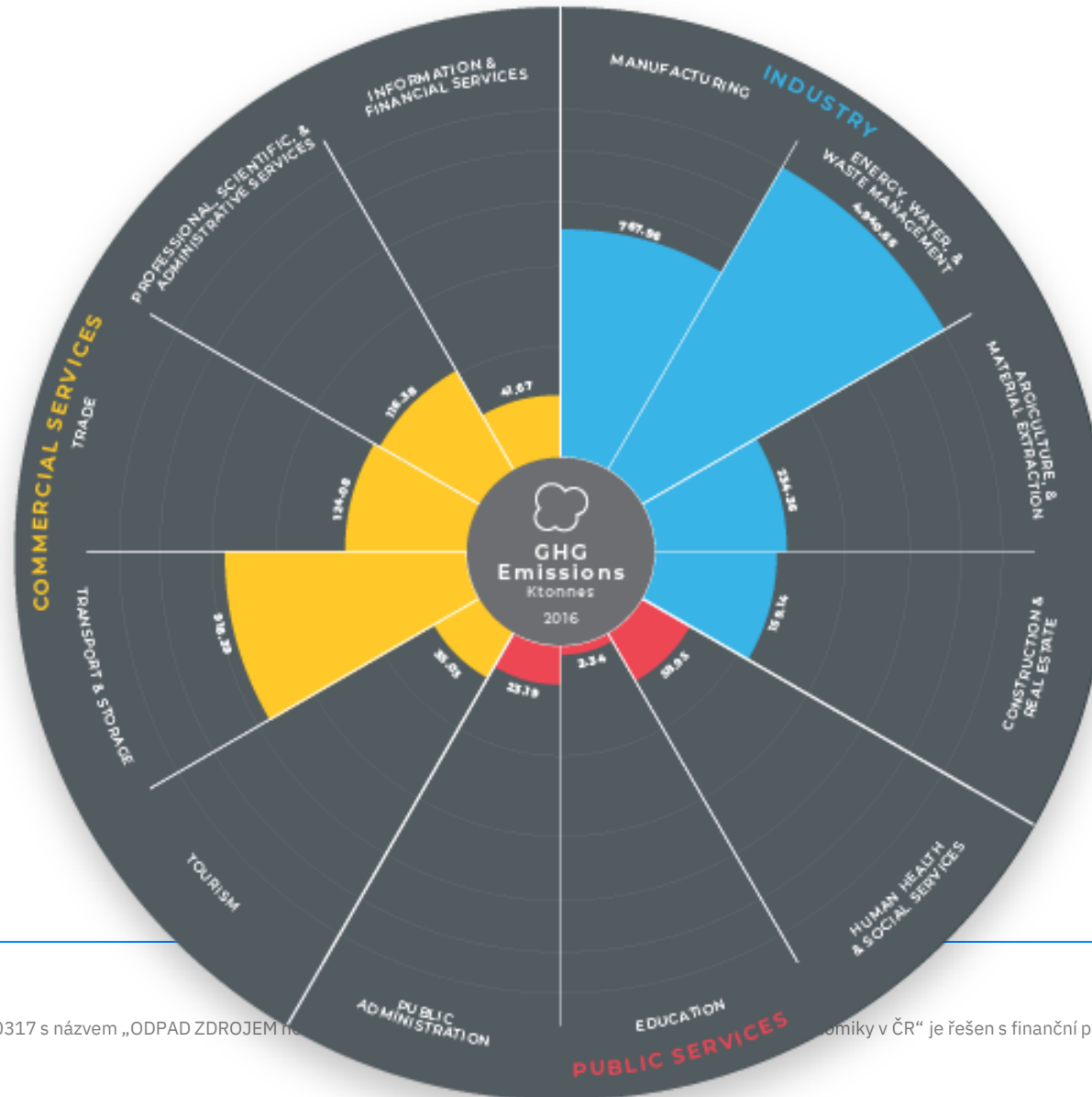
Projekt číslo TL01000317 s názvem „ODPAD ZDROJEM“ – ekonomiky v ČR“ je řešen s finanční podporou TA ČR.

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PHASE 1: ECONOMIC ANALYSIS – employment



PHASE 1: ENVIRONMENTAL ANALYSIS – CO₂



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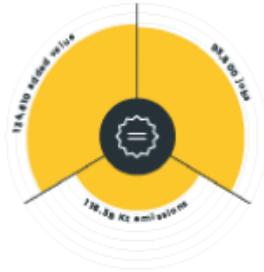
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PHASE 1: LOCAL AGENDA

COMMERCIAL SERVICES



INFORMATION AND FINANCIAL SERVICES



PROFESSIONAL, SCIENTIFIC, AND ADMINISTRATIVE SERVICES



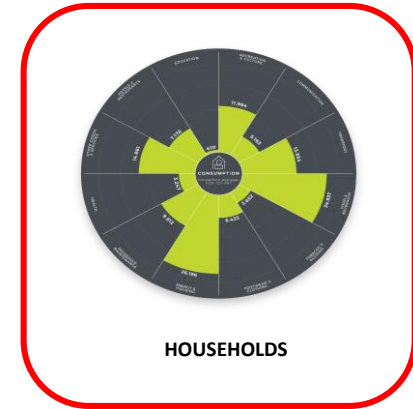
TRADE



TRANSPORT AND STORAGE



TOURISM

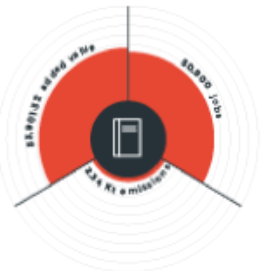


HOUSEHOLDS

PUBLIC SERVICES



PUBLIC ADMINISTRATION



EDUCATION



HUMAN HEALTH AND SOCIAL SERVICES

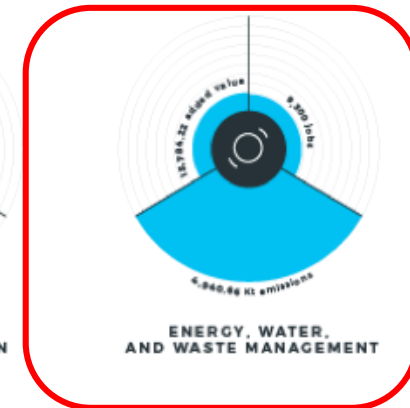
INDUSTRY



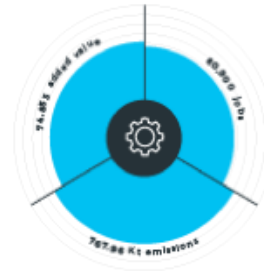
CONSTRUCTION AND REAL ESTATE



AGRICULTURE, AND MATERIAL EXTRACTION



ENERGY, WATER, AND WASTE MANAGEMENT



MANUFACTURING



Analyzing the current political agenda of the city

INTRODUCTION TO CIRCULAR ECONOMY
AND THE KEY ROLE OF CITIES

CIRCLE
ECONOMY



PRAGUE
PRAGUE
PRAGUE
PRAGUE

#JoinTogether
#DržetSpolu

CIRKULÁRNÍ
HUB PRAHA

Projekt číslo TL01000317 s názvem „ODPAD ZDROJEM neboli uplatnění nových metod výzkumu pro rozvoj cirkulární ekonomiky v ČR“ je řešen s finanční podporou TA ČR.

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PHASE 2 – CONSTRUCTION MFA



Circular opportunity
Increase use of secondary materials

Circular opportunity

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PHASE 2 – CONSTRUCTION MFA



- In Prague, we use **13,5 milion tons of construction materials** for new buldings every year
- **95 % of materials** used for construction are from **primary sources**
- There is a **lack of data**, as well as rules that would enable to use the demolition waste as a resource again



PHASE 2: HOUSEHOLDS MFA

1

HOUSEHOLDS - HIGHLIGHT 1

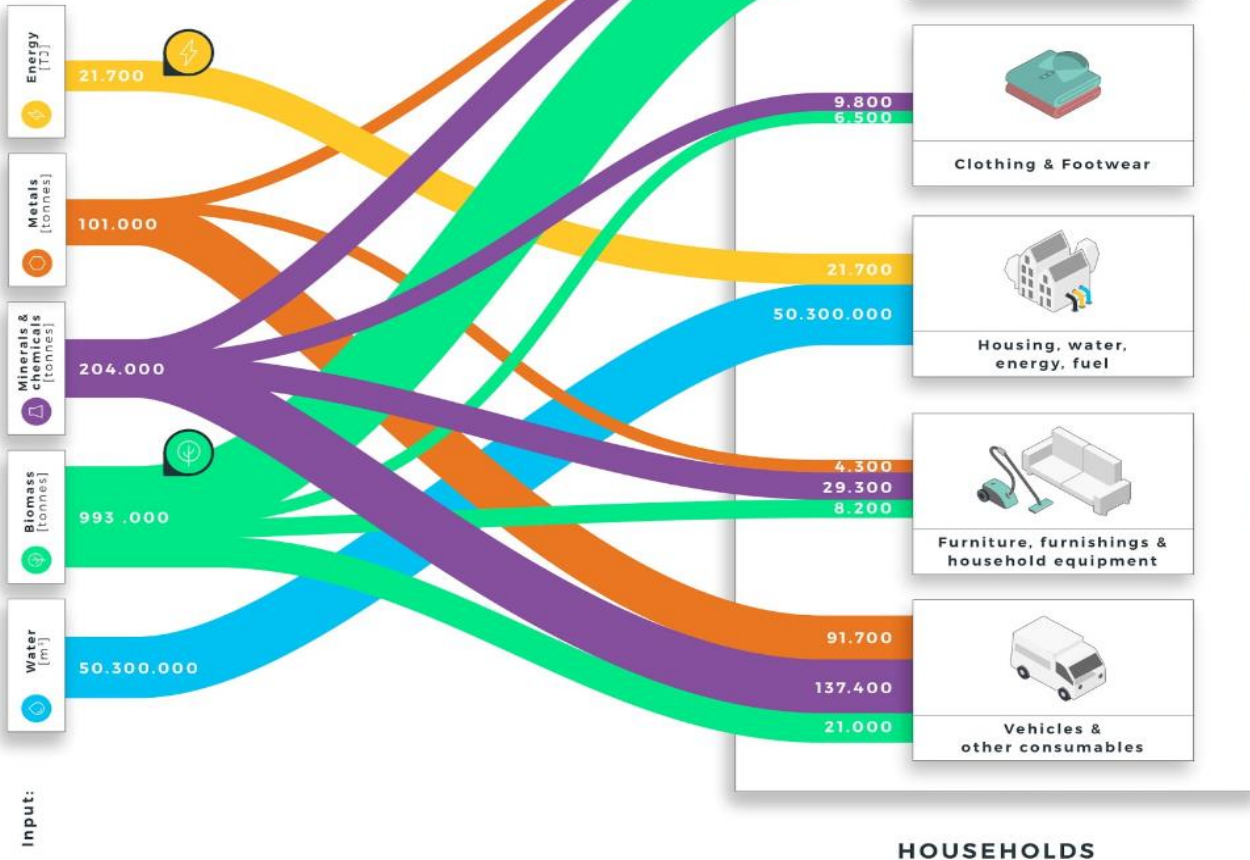
Material flows break-down into products



Household energy consumption



Household food consumption



Circular opportunity:
Circular food consumption



Circular opportunity:
Repair & reuse of household products

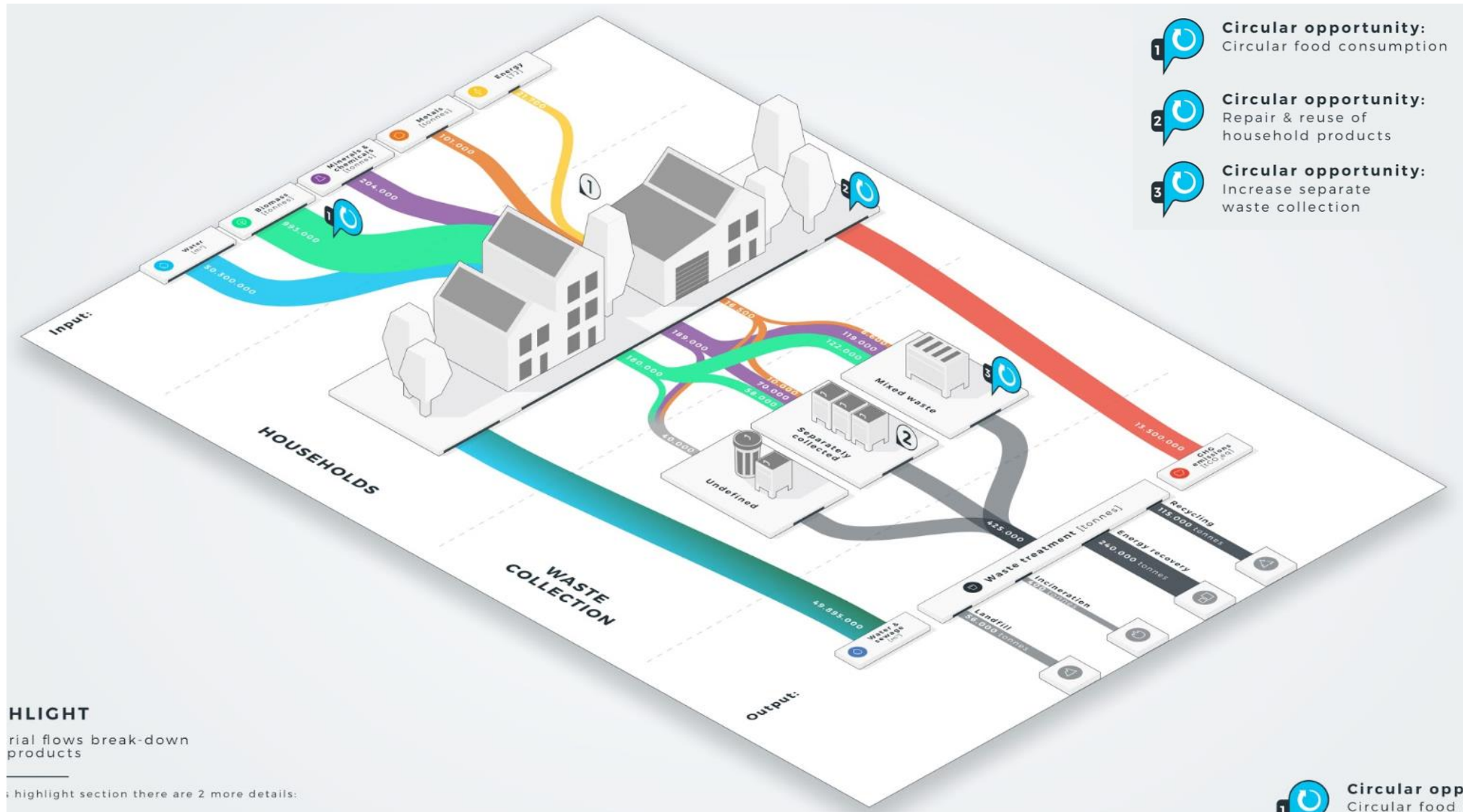


Circular opportunity:
Increase separate waste collection



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PHASE 2: HOUSEHOLDS MFA



HIGHLIGHT
 Material flows break-down products
 In highlight section there are 2 more details:
 L1: household energy consumption



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PHASE 2: HOUSEHOLDS MFA



1 **Circular opportunity:**
Circular food consumption

2 **Circular opportunity:**
Repair & reuse of household products

3 **Circular opportunity:**
Increase separate waste collection

- Biomass is the most prominent material used by citizens to sustain their needs. About **180 000 tons** of it **is wasted / year**
- **80 000 tons of furniture**, and **construction materials** is destroyed in take back centres every year
- **Prague** is one of **the worst** from all cities in Czech in **sorting out its waste**



PHASE 2: WATER, ENERGY, WASTE MFA



- Vast majority of **rainwater (40 000 000 m³) is washed away** down the drain to the local waste water treatment plant
- **70 % of all the waste is exported** outside of the city boundaries
- **180 000 tons of biowaste** from citizens is largely being **incinerated**



PHASE 2: STRATEGIES



Circular strategy	Environmental potential					Economic potential				Technical feasibility		
	Reduce generation of waste	Reduce CO2 emissions	Reduce raw material consumption	Increase secondary materials	Increase climate change adaptation	Job creation	Return of Investment	Initial investment costs	Scale up potential	Technology readiness level	Legal barriers	Institutional barriers
Online secondary materials marketplace	2	2	2	3	-	1	3	2	2	3	2	2
Cycling sludge into construction material	3	1	2	2	-	1	2	1	3	2	2	2
Cycling slag into construction material	3	1	2	2	-	1	2	1				
Recycling excavation materials into construction materials	3	1	2	3	-	1	2	1				
Building stock material database	1	2	2	2	-	1	2	1				
Material passports in construction projects	2	2	2	2	-	1	2	1				
Circular tendering criteria in construction projects	2	2	3	3	2	2	2	2				
Circular deconstruction practices	3	1	2	3	-	2	3	1				



Circular strategy	Environmental potential					Economic potential				Technical feasibility		
	Reduce generation of waste	Reduce CO2 emissions	Increase recycling	Increase awareness	Increase sustainable consumption	Job creation	Return of Investment	Initial investment costs	Scale up potential	Technology readiness level	Legal barriers	Institutional barriers
Urban food production strategy	-	2	-	2	2	2	2	2	1	3	2	2
Digital tools for food sharing	2	2	-	2	2	1	2	1	3	3	2	2
Circular shopping centre	2	1	1	3	3	3	3	1	3	3	1	1
Repair 'hubs'	2	1	1	3	2	2	2	2	2	3	3	3
Community-based reward and recycling platform	2	1	2	2	1	1	2	2	2	3	2	2
Reverse logistics for E-waste	2	1	2	2	1	1	3	2	3	2	2	2



Circular strategy	Environmental potential					Economic potential						
	Reduce generation of waste	Reduce CO2 emissions	Reduce raw material consumption	Increase secondary materials	Increase climate change adaptation	Job creation	Return of Investment	Initial investment costs	Scale up potential	Technology readiness level	Legal barriers	Institutional barriers
Urban green roof strategy	-	2	1	-	3	2	2	2	2	3	2	2
Decentralised rainwater management	-	2	1	-	3	2	1	1	2	3	2	2
Rainwater management platform	-	2	-	-	3	1	1	3	2	3	3	2
Decentralised 'circular hubs'	3	2	2	3	-	3	3	2	3	2	2	1
'Smart' waste collection infrastructure	2	2	-	-	-	2	2	1	2	3	2	2
Biomass to biofuels	2	2	2	2	2	2	2	1	2	3	2	2
Decentralised biomass collection and processing	3	1	1	2	2	1	3	1	2	3	1	2

„cirkulární ekonomiky v ČR“ je řešen s finanční podporou TA ČR.

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Prioritizing circular strategies



CIRCULAR STRATEGIES



CONSTRUCTION

Circular tendering
criteria



HOUSEHOLDS

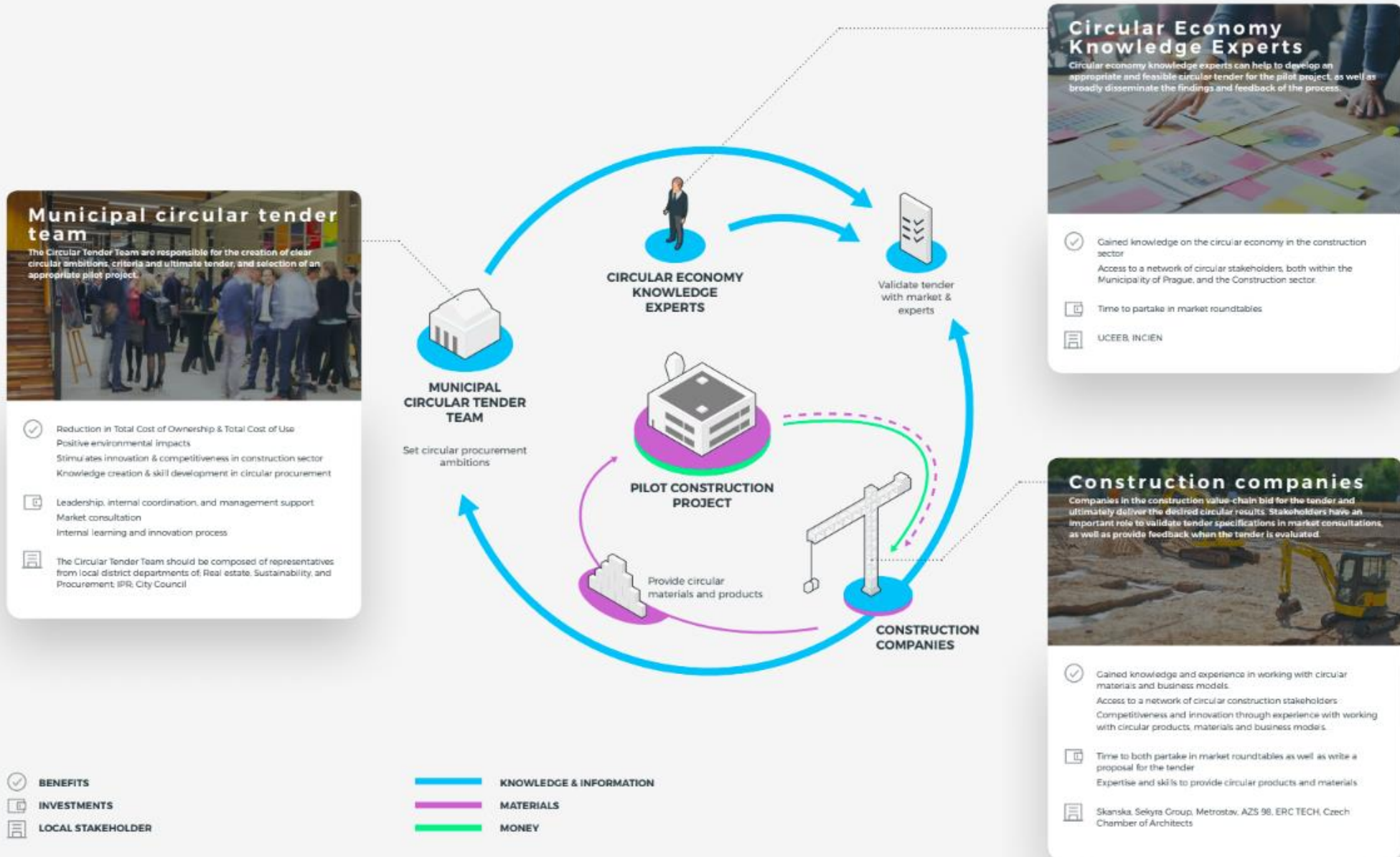
Circular
ReUse Hub



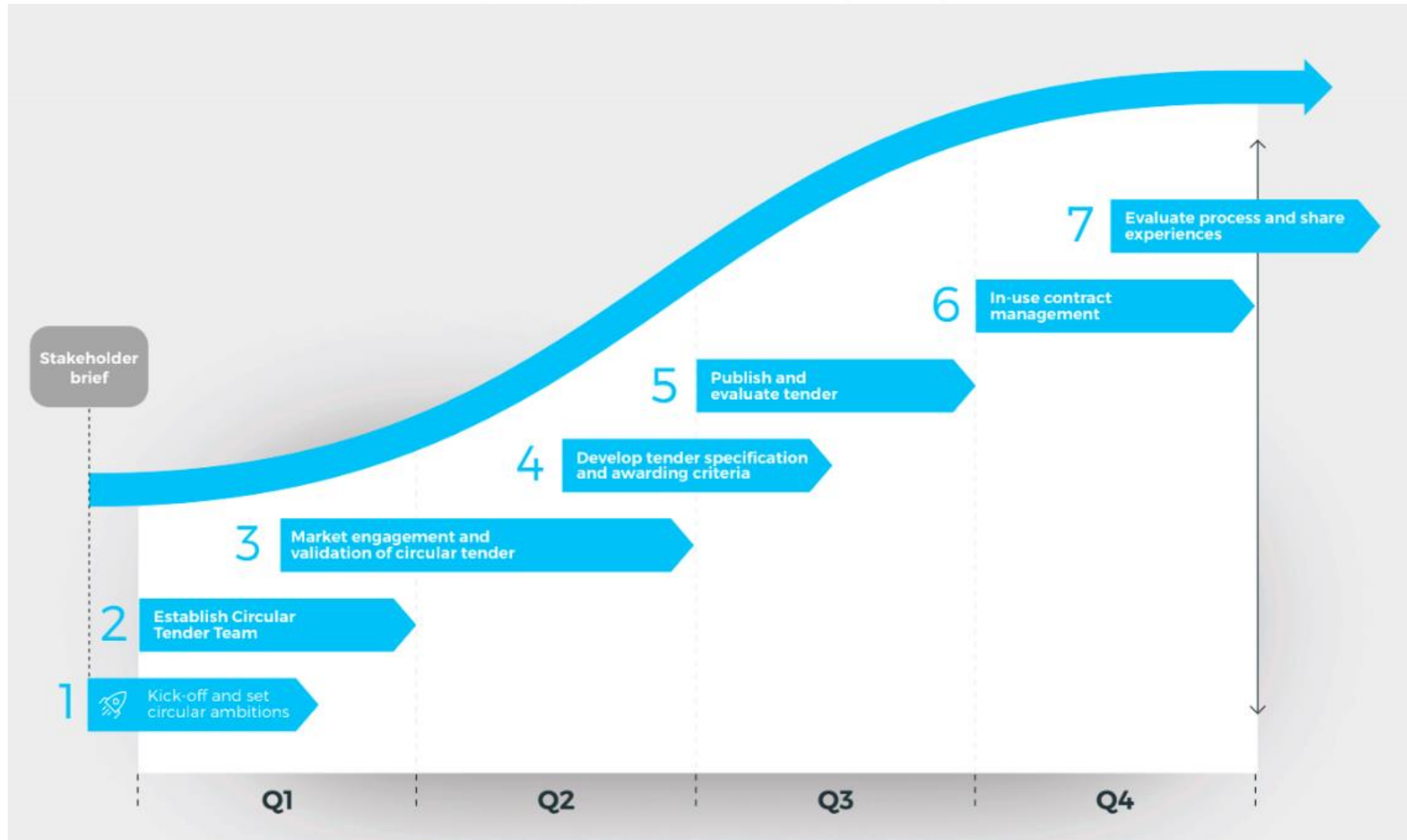
UTILITIES

Waste biomass to
BioCNG

PHASE 3: ACTION PLAN – CIRCULAR TENDERING



PHASE 3: ACTION PLAN – CIRCULAR TENDERING



PHASE 3: ACTION PLAN – REUSE HUBS



Citizens

Citizens of Prague generate 307,000 tonnes of waste consumer goods and will bring their unwanted items and sorted municipal wastes to the ReUse Hub to be prepared for upcycling and reuse, as well as attend workshops, talks and events hosted on circular topics.

- ✓ Education and awareness of the circular economy
Economic savings in purchasing reused products
- 📅 Deposit of unwanted products and wastes to the ReUse Hub
Time to participate in stakeholder roundtables to shape the requirements of the ReUse Hub
- 🏠 Households in Prague



Waste managers

This stakeholder is responsible for leading the project and translating the concept into a tangible pilot, taking the input from all stakeholders and ultimately shaping the pilot to maximise its potential benefits for the City of Prague. The staff of the municipal waste collection yards are responsible for the initial collection and sorting of the deposited items to be reused.

- ✓ Cost reductions in waste treatment.
Revenue generated from the rental of space at the ReUse Court
Reduced quantities of waste generated as ~70% of the items that are donated can be reused²⁴
Employment and training opportunities particularly for citizens with a distance to the labour market
Reduced CO2eq. Emissions estimated between 200 - 1,300 tonnes per year²⁵
- 📅 Time to organise, plan and host stakeholder roundtables
Leadership and project management skills to coordinate a large number of stakeholders
Communication campaign to showcase the ReUse Hub to citizens
Financial support for the initial investment costs of a ReUse Hub
Physical location with sufficient dry space for storage
- 🏠 Pražské služby a.s.



Municipality of Prague

The Municipality of Prague plays an important supporting role in the creation of ReUse Hubs. Support comes in the form of political leadership, communication through official channels, as well as provision of financial support.

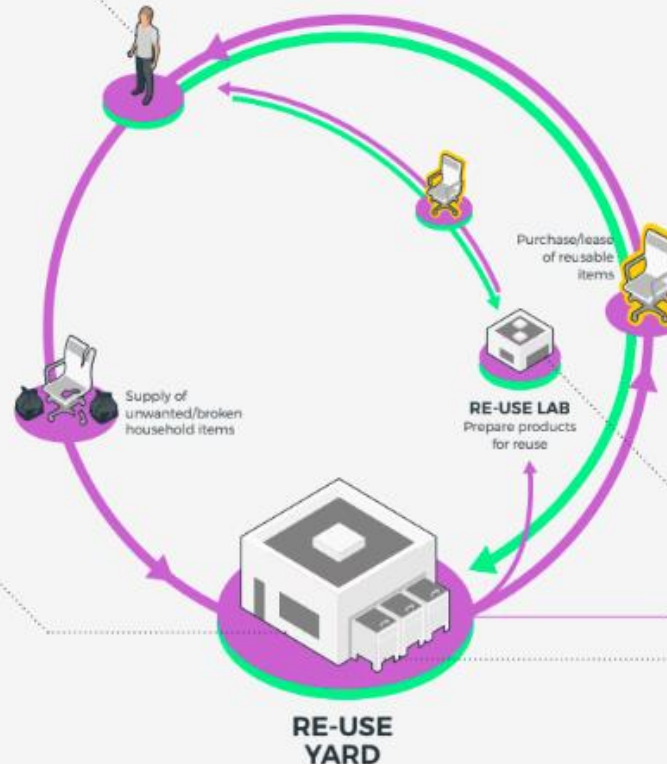
- ✓ Contribute towards municipal goals of
Increase proportion of reuse and recycling
Employment opportunities, particularly for citizens with a distance to the labour market
Reduce CO2eq. emissions
- 📅 Political support and leadership to secure implementation
Financial support for initial investment costs
Communication of the ReUse Hub through municipal channels
- 🏠 Department of Waste Management



ReUse organisations

ReUse Organisations maintain clean and attractive aesthetic and additional circular activities, such as the repair of items and provision of creative arts and handcraft workshops. Organisations can be located both in ReUse Courts, and ReUse Labs.

- ✓ Employment opportunities, particularly for citizens with a distance to the labour market
Revenue from the sale (and/or leasing) of reused products and provision of workshops
- 📅 Time to participate in stakeholder roundtables
Staff to perform the required services at the ReUse Hub
Communication of the ReUse Hub both on- and off-line online
- 🏠 Oprávněná.cz, Knihovna věcí, Z Pokoje do pokoje, SWAP Prague



- ✓ BENEFITS
- 📅 INVESTMENTS
- 🏠 LOCAL STAKEHOLDER
- MATERIALS
- MONEY



PHASE 3: ACTION PLAN – BIOMASS -> BIOCNG



Households, Food retail & catering industries

Approximately 93.500 tonnes of biodegradable wastes are produced from Prague's households and food industries each year, which can be separately collected and transformed into biofuels.

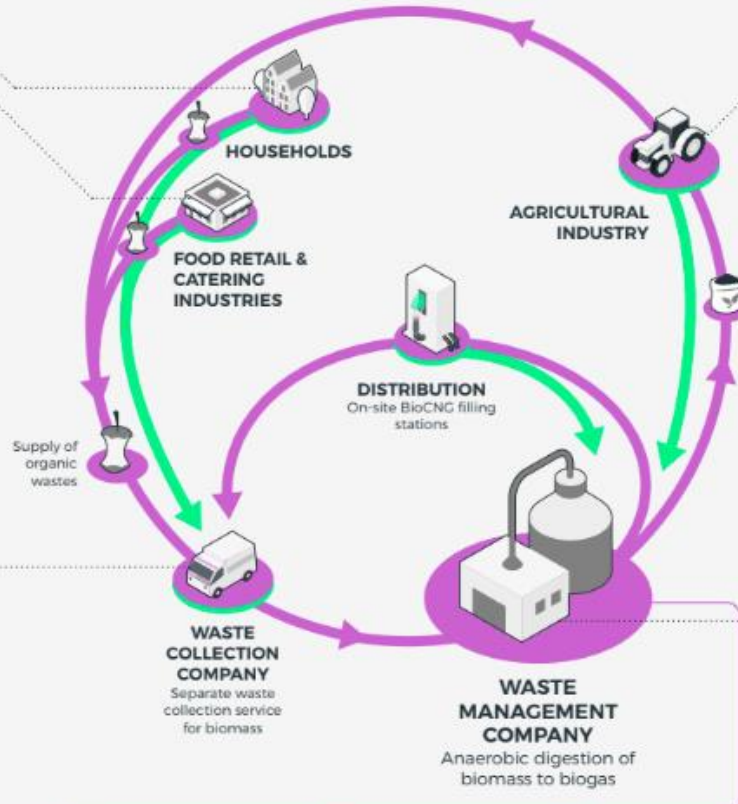
- ✓ Reduced costs for waste collection
- ✓ Healthy and livable environment through reduced noise and pollution of waste collection vehicles
- 📄 Shift of behavioural habits to separately dispose of organic wastes
- 📄 Households, Supermarkets, Farmers markets, Hotels, School canteens, Cafés, Restaurants



Waste collection company

Waste collection company is responsible for the separate collection of residual biomass streams throughout Prague. Prague's primary waste management company already possesses 110 CNG-enabled vehicles. It is estimated that 67% of the bioCNG that can be generated in Prague can power the entire fleet.

- ✓ Reduced greenhouse gas emissions of the waste collection fleet by ~65%
- ✓ Reduced pollution of NOx and fine dust emissions!
- ✓ Reduced noise of waste collection fleet by a perceived 50%
- ✓ Reduced and more stable cost of fuels
- ✓ Sustainable image
- 📄 BioCNG enabled vehicle fleet
- 📄 Training for drivers to manage new fleet requirements
- 📄 Increased costs for the separate biowaste collection service of approximately CRK 20,000,000*
- 📄 Pražské služby a.s.



Agricultural industry

The potential 100.000m³ of digestate that are produced from the biomass to BioCNG process can be utilised by the agricultural industry as a natural fertiliser.

- ✓ Substitution of chemical fertiliser with a renewable source of organic fertiliser produced from digestate
- 📄 No additional requirements
- 📄 Local farmers, City of Prague (owner of agricultural land, parks & forests)



Waste management company

The waste management company takes a leading role in the development of a biomass to BioCNG project, facilitating the attainment of necessary funding and permits, and aligning with relevant stakeholders. The waste management company is also responsible for the operation and maintenance of the biomass to BioCNG facility.

- ✓ High-value cycling of residual biomass
- ✓ Revenue from sale and supply of BioCNG and digestate. Return on investment dependent on attainment of subsidies
- ✓ Increased efficiency of Zvevo Malešice waste to energy plant due to the diversion of wet biomass
- ✓ Staff for the operation and maintenance of the plant, of which 5 are part-time service staff, 1 office worker, and 1 sales representative
- 📄 Time to manage the development of the project
- 📄 Investment costs depending on the size of plant of which 45% could be funded through environmental subsidies
- 📄 Pražské služby a.s.



CONCLUSIONS



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portál hlavního města Prahy

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Praha zvažuje stavbu městské bioplynové stanice

Rada hl. m. Prahy dnes vzala na vědomí informaci o záměru postavit na území hlavního města bioplynovou stanici. Ta by měla pomoci kvalitně zpracovat a využít biologicky rozložitelné odpady pocházející od obyvatel, živnostníků i z průmyslu. Ty v současné době končí ve spalovně či na skládce, v horším případě často i v kanalizaci. Bioplynová stanice může dodávat biopalivo BioCNG vhodné pro nákladní vozy v městském provozu či může doplňovat bioplyn do městské sítě.



Odpadová bioplynová stanice
Romerike

25. března 2019



platnění no

CONCLUSIONS

- ✓ Important decision makers in the city need to be on board
 - ✓ Interviews and stakeholders engagement is crucial for lifting projects of the ground
 - ✓ Data can really help with decision making, but its important to align with city's problems and current atmosphere if you want results fast
 - ✓ Focus on the follow-up, keep up the momentum, dont produce another study for the drawer
-





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CONTACT



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