The work plan

My task includes technology description of various technologies in metallurgy for GHG emission reduction in Ukraine and in Europe with allowance different scenarios.

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Purposes of my research

1. Overall assessment of the state of opportunities to prevent a climate change.

2. This work presents for spurring deployment of the most important clean technologies and for overcoming existing barriers.

3. Development of scenarios for the purpose to show variants of development metallurgy in future with allowance GHG emission reduction and different economical, natural, and political events.

The initial data

1. World war – 13,5 t/per capita

2. The invention of the material to substitute steel – 12,67 t/per capita

3. Natural disasters – 13,29 t/per capita

4. The invention in mechanical engineering – 13,3 t/per capita

The calculation method

1. From the prediction of the growth of population calculate a steel consumption using the rate of consumption per capita.

2. Scenarios development with allowance price, emission… factors.

3. According to the scenarios calculate production of steel for each technology.

4 Calculate GHG emission for each technology with allowance different composition of raw materials and receive the amount of GHG emission.

5 Representation of the result in graphical form.

The technologies prioritization

The price factor

Technologies	Investment cost	Productivity
HIsarna	100	1 Mt/year
Finex	460	2 Mt/year
CCS with BF	107	0.5-5.0 Mt/year Depends on furnace volume
Blast furnace without any GHG reductions technologies	90	0.5-5.0 Mt/year Depends on furnace volume
Fastmelt	150	1.5 Mt/year
Blast furnace TGR configuration	100	0.5-5.0 Mt/year Depends on furnace volume

The technologies prioritization

The emission factor

Technologies	Type of raw materials	GHG emission
HIsarna	Char coal, iron ore, scale, agglomerate.	With CCS: -0,33 tCO_2/t HM Without CCS: -1.32 tCO_2/t HM
Finex	Char coal, iron ore, scale, agglomerate, **coking coal**	With CCS: -0,2313 tCO_2/t HM Without CCS: - 1.864 tCO_2/t HM
CCS with BF	iron ore, **coking coal,** agglomerate, limestone	0,34 tCO_2/t HM
Blast furnace without any GHG reductions technologies	iron ore, **coking coal**, agglomerate, limestone	1,742 tCO_2/t HM
Fastmelt	Char coal, iron ore, scale, agglomerate.	With CCS: -0,76 tCO_2/t HM Without CCS – 1,59 tCO_2/t HM
Blast furnace TGR configuration	iron ore, **coking coal**, agglomerate, limestone	With CCS: -0,79 tCO_2/t HM Without CCS – not relevant

The initial data (events and population)

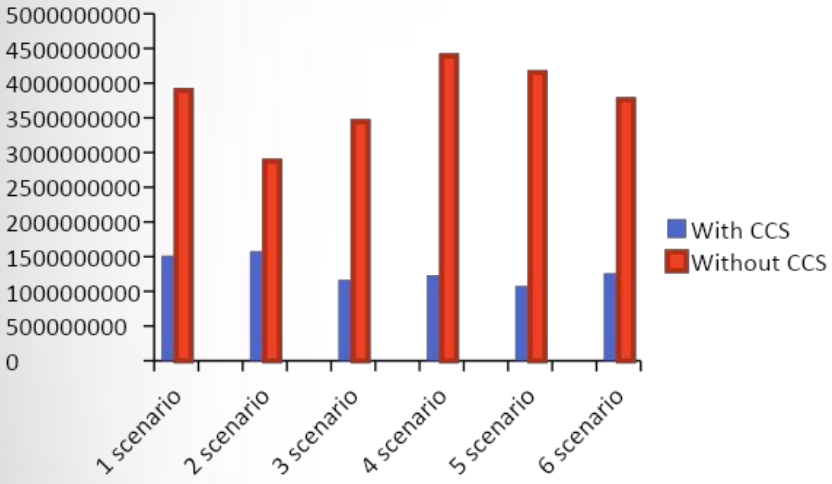
	World war	The invention of the material to substitute steel	Natural disaster	The invention in mechanical engineering
Low variant	3674497500	3448583950	3617338650	3620060500
Medium variant	4507461000	4230335620	4437344940	4440683800
Hight variant	3548042312	3329903414	3492850542	3495478722
Zero migration	4354803000	4087063260	4287061620	4290287400

Scenarios

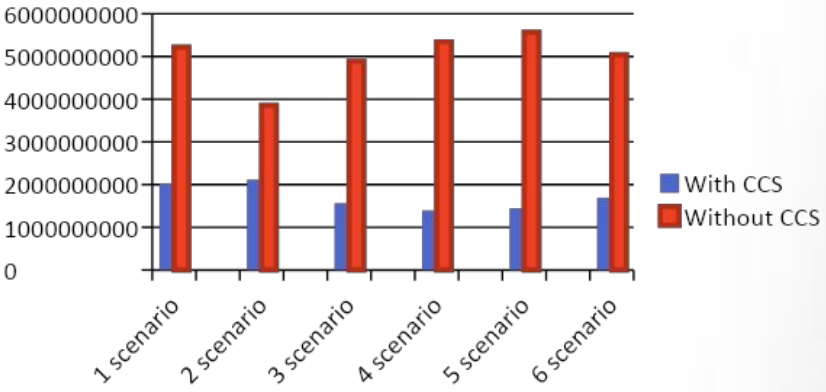
	1 scenario	2 scenario	3 scenario	4 scenario	5 scenario	6 scenario
TGR	10%	60%	10%	15%	5%	20%
Hisarna	15%	15%	50%	20%	15%	20%
Finex	5%	15%	10%	40%	5%	20%
Fastmelt	50%	5%	20%	10%	15%	20%
BF	20%	5%	10%	15%	60%	20%

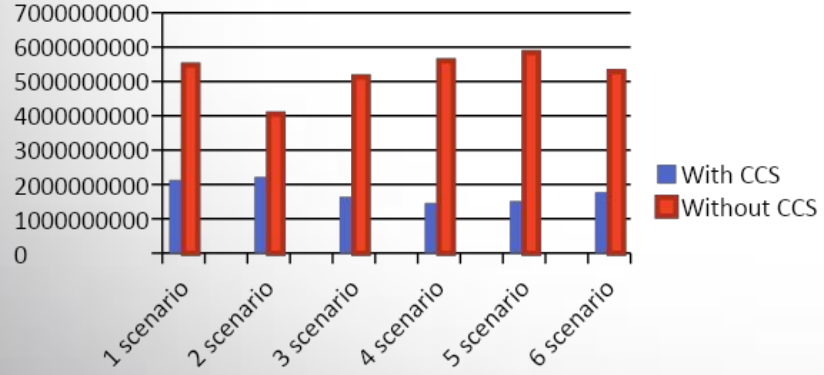
Low variant

World war

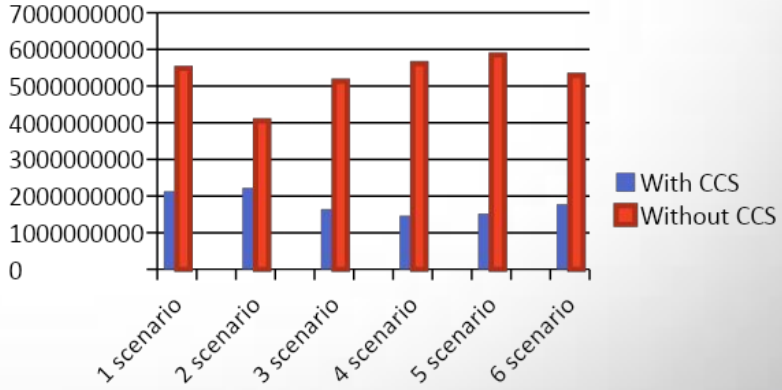


Substitution steel





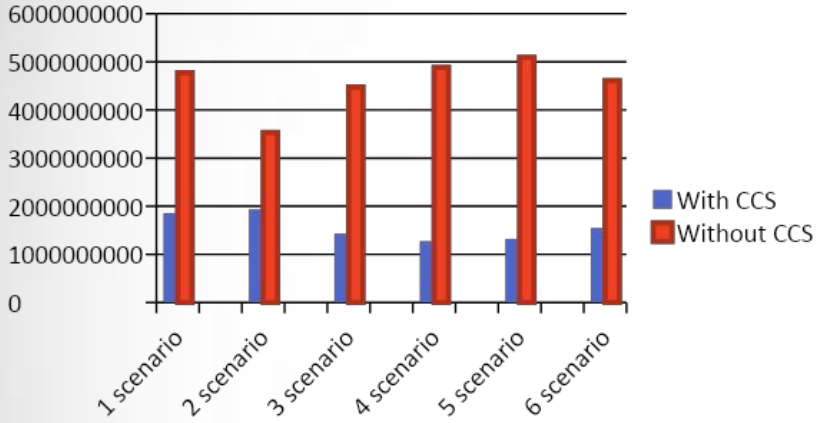
Natural disaster



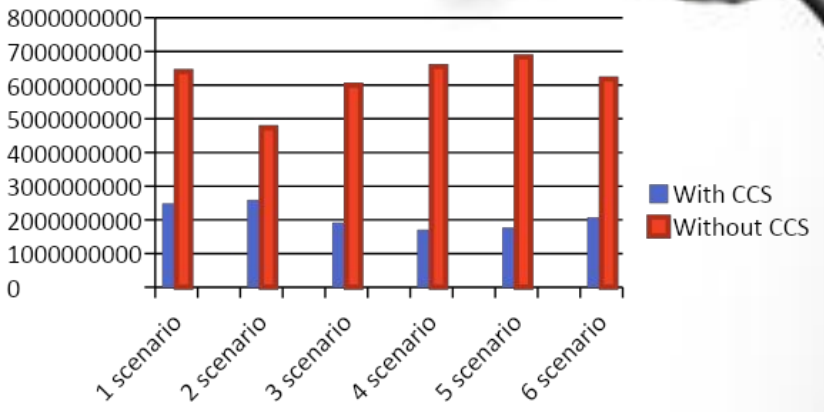
Invention in mechanic

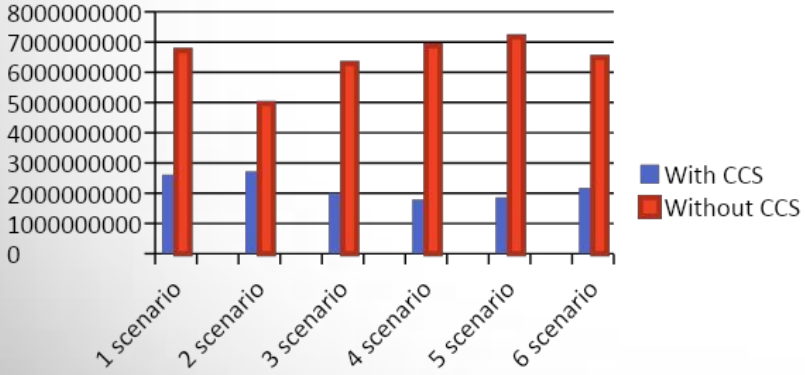
Medium scenario

World war

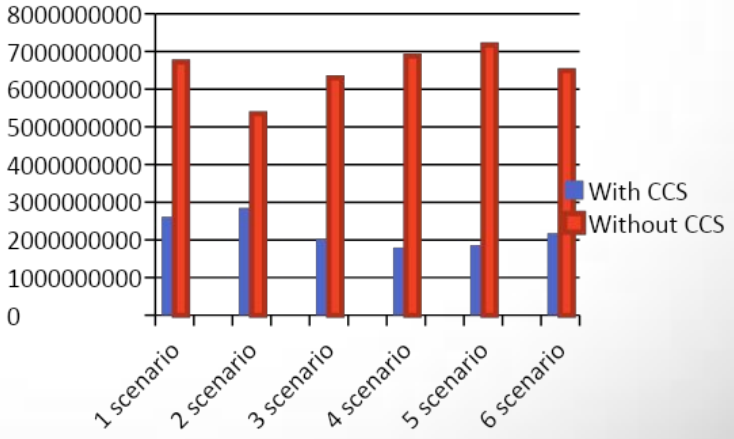


Substitution steel





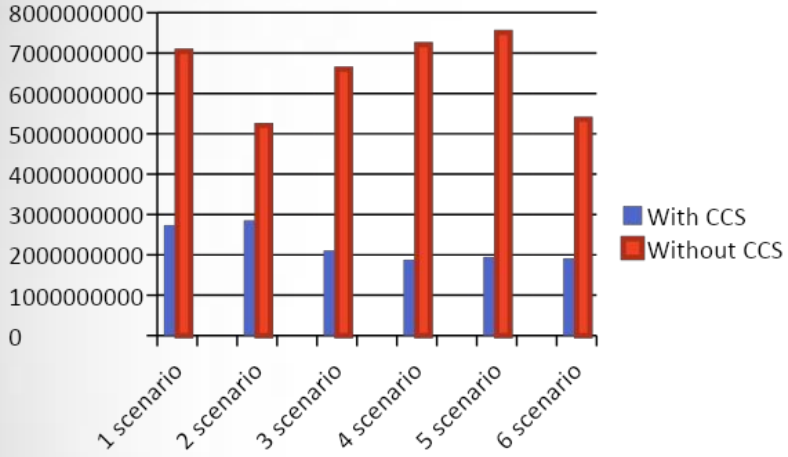
Natural disaster



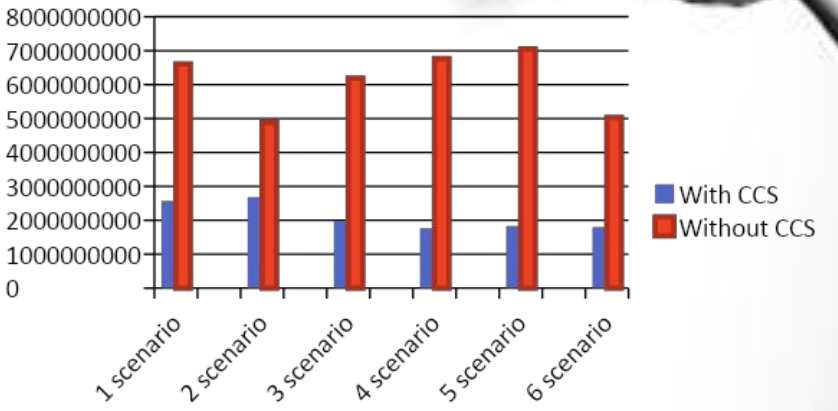
Invention in mechanic

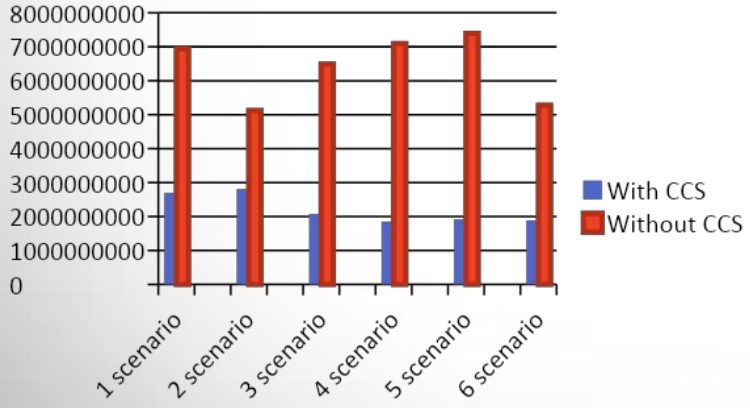
Hight variant

World war

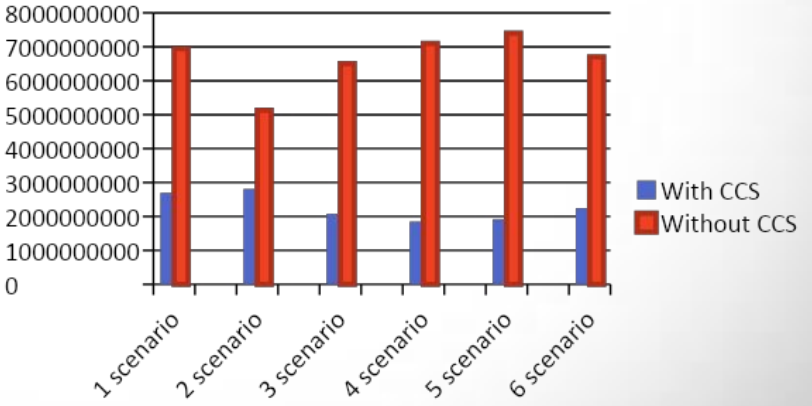


Substitution steel





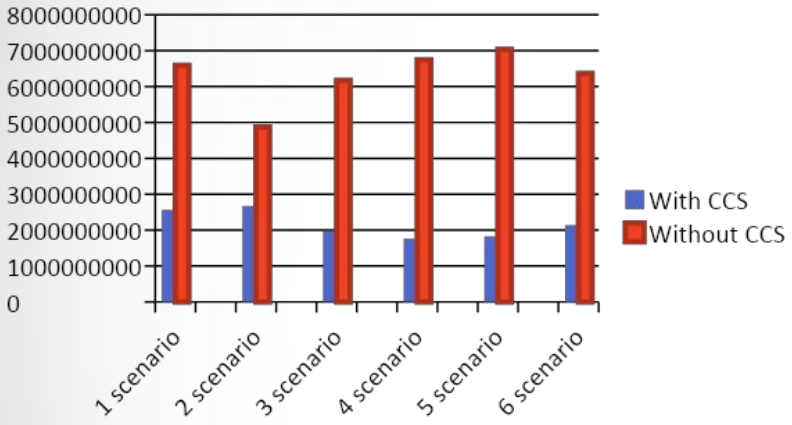
Natural disaster



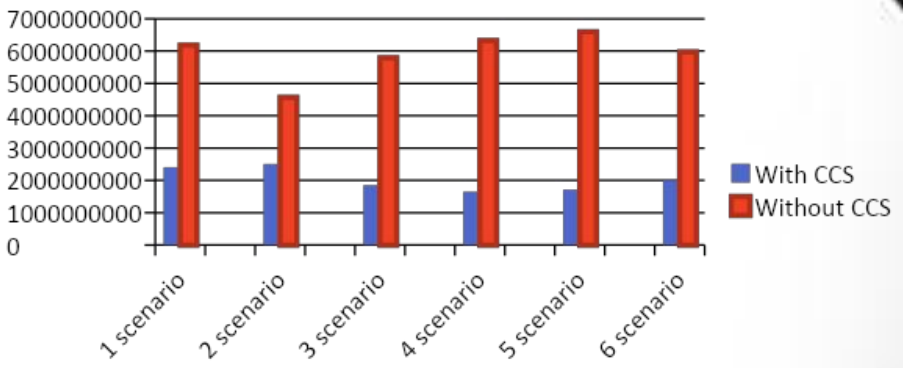
Invention in mechanic

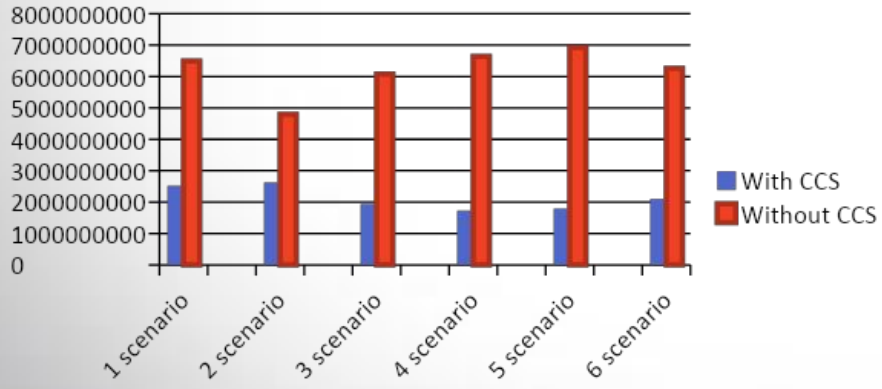
Zero migration

World war

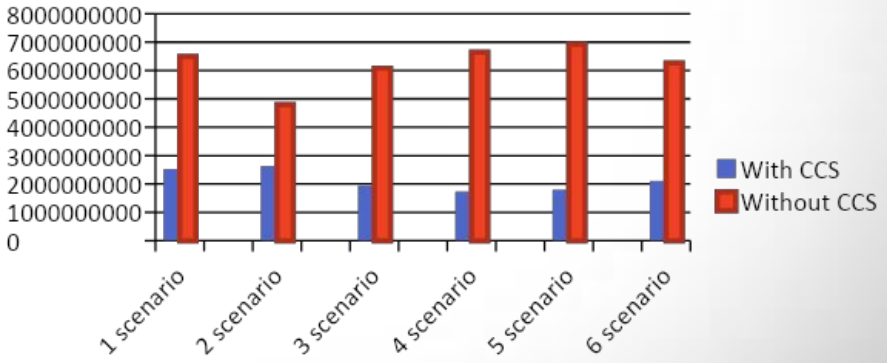


Substitution steel





Invention in mechanic



Invention in mechanic

Thank you for your attention