## 1. Solution number and depth

-description: We wanted to evaluate how schedules improve as more solutions are explored at different depths. We found that there was no benefit in going above depth 10 or evaluating more than 100 solutions. After that point there were slight differences in schedules, but the expected utilities were virtually identical. Below are the parameters needed to test at depths 2, 3, 5, 10 and 20.

-initial state:

| Country | population | metalElements | timber | land Area | water | metal Alloys | electronics | housing | food | metalAlloysWaste | housing Waste | electronicsWaste | food Waste |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Atlantis | 20000 | 1200 | 7000 | 20000 | 40000 | 1500 | 500 | 20000 | 12000 | 1600 | 1800 | 1200 | 2000 |
| Brobdingnag | 14000 | 1200 | 4000 | 20000 | 45000 | 700 | 500 | 18000 | 16000 | 1800 | 1200 | 1000 | 1600 |
| Carpania | 12000 | 2000 | 7000 | 20000 | 45000 | 500 | 1500 | 22000 | 14000 | 1400 | 1600 | 1800 | 2000 |
| Dinotopia | 14000 | 2000 | 20000 | 25000 | 35000 | 700 | 1100 | 16000 | 18000 | 1800 | 1000 | 1600 | 1200 |
| Erewhon | 14000 | 2000 | 20000 | 25000 | 50000 | 1100 | 500 | 20000 | 14000 | 2000 | 1200 | 1800 | 1000 |
| MyCountry | 10000 | 1600 | 19000 | 20000 | 40000 | 700 | 1300 | 18000 | 18000 | 1200 | 1400 | 1000 | 1000 |

-parameters:
   initial_state_filename = "./input_files/countries.xlsx"
   output_schedule_filename = "./output_files/random_d2.txt"
   depth = 2
   solution_limit = 1000
-output:
   Number of solutions: 1
   Best solution EU: 567364
   Best Path:
   ('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 567364')
   Number of solutions: 5
   Best solution EU: 694040
   Best Path:
   ('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 567364')
   ('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 694040')
   Number of solutions: 10
   Best solution EU: 694040
   Best Path:
   ('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 567364')
   ('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 694040')
   Number of solutions: 50
   Best solution EU: 694040

Best Path:
('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 567364')
('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 694040')
Number of solutions: 100
Best solution EU: 694040
Best Path:
('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 567364')
('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 694040')
Number of solutions: 500
Best solution EU: 694040
Best Path:
('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 567364')
('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 694040')
Number of solutions: 1000
Best solution EU: 694040
Best Path:
('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 567364')
('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 694040')

  -parameters:
    initial_state_filename = "./input_files/countries.xlsx"
    output_schedule_filename = "./output_files/random_d3.txt"
    depth = 3
    solution_limit = 1000
  -output:
    Number of solutions: 1
    Best solution EU: 567364
    Best Path:
('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 567364')
    Number of solutions: 5
    Best solution EU: 784670
    Best Path:
('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 567364')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 694040')
('TRANSFER', 'Atlantis', 'MyCountry', ('metalAlloys', 100), 'EU: 784670')
('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1100.0), 'EU: 784670')
Number of solutions: 10
Best solution EU: 784670
Best Path:
('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 567364')
('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 694040')
('TRANSFER', 'Atlantis', 'MyCountry', ('metalAlloys', 100), 'EU: 784670')
('TRANSFER', 'MyCountry', 'Atlantis', ('electronics', 51.16279069767442), 'EU: 784670')
Number of solutions: 50
Best solution EU: 784670
Best Path:
('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 567364')
('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 694040')
('TRANSFER', 'Brobdingnag', 'MyCountry', ('metalAlloys', 100), 'EU: 784670')
('TRANSFER', 'MyCountry', 'Brobdingnag', ('electronics', 51.16279069767442), 'EU: 784670')
Number of solutions: 100
Best solution EU: 784670
Best Path:
('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 567364')
('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 694040')
('TRANSFER', 'Brobdingnag', 'MyCountry', ('metalAlloys', 100), 'EU: 784670')
('TRANSFER', 'MyCountry', 'Brobdingnag', ('timber', 1100.0), 'EU: 784670')
Number of solutions: 500
Best solution EU: 784670
Best Path:
('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 567364')
('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 694040')
('TRANSFER', 'Brobdingnag', 'MyCountry', ('metalAlloys', 100), 'EU: 784670')
('TRANSFER', 'MyCountry', 'Brobdingnag', ('electronics', 51.16279069767442), 'EU: 784670')
Number of solutions: 1000
Best solution EU: 784670
Best Path:

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 567364')
('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 694040')
('TRANSFER', 'Brobdingnag', 'MyCountry', ('metalAlloys', 100), 'EU: 784670')
('TRANSFER', 'MyCountry', 'Brobdingnag', ('timber', 1100.0), 'EU: 784670')

  -parameters:
    initial_state_filename = "./input_files/countries.xlsx"
    output_schedule_filename = "./output_files/random_d5.txt"
    depth = 5
    solution_limit = 1000
  -output:
    Number of solutions: 1
    Best solution EU: 567364
    Best Path:
    ('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 567364')
    Number of solutions: 5
    Best solution EU: 883576
    Best Path:
    ('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 567364')
    ('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 694040')
    ('TRANSFER', 'Atlantis', 'MyCountry', ('metalAlloys', 100), 'EU: 784670')
    ('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1100.0), 'EU: 784670')
    ('TRANSFER', 'Atlantis', 'MyCountry', ('metalElements', 100), 'EU: 843977')
    ('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1050.0), 'EU: 843977')
    ('TRANSFER', 'Atlantis', 'MyCountry', ('metalElements', 100), 'EU: 883576')
    ('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1050.0), 'EU: 883576')
    Number of solutions: 10
    Best solution EU: 883576
    Best Path:
    ('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 567364')
    ('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 694040')
    ('TRANSFER', 'Atlantis', 'MyCountry', ('metalAlloys', 100), 'EU: 784670')
    ('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1100.0), 'EU: 784670')
    ('TRANSFER', 'Atlantis', 'MyCountry', ('metalElements', 100), 'EU: 843977')
    ('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1050.0), 'EU: 843977')
    ('TRANSFER', 'Atlantis', 'MyCountry', ('metalElements', 100), 'EU: 883576')
    ('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1050.0), 'EU: 883576')
    Number of solutions: 50
    Best solution EU: 883576
    Best Path:

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 567364')
('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 694040')
('TRANSFER', 'Atlantis', 'MyCountry', ('metalAlloys', 100), 'EU: 784670')
('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1100.0), 'EU: 784670')
('TRANSFER', 'Atlantis', 'MyCountry', ('metalElements', 100), 'EU: 843977')
('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1050.0), 'EU: 843977')
('TRANSFER', 'Atlantis', 'MyCountry', ('metalElements', 100), 'EU: 883576')
('TRANSFER', 'MyCountry', 'Atlantis', ('electronics', 48.83720930232558), 'EU: 883576')
Number of solutions: 100
Best solution EU: 883576
Best Path:
('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 567364')
('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 694040')
('TRANSFER', 'Atlantis', 'MyCountry', ('metalAlloys', 100), 'EU: 784670')
('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1100.0), 'EU: 784670')
('TRANSFER', 'Atlantis', 'MyCountry', ('metalElements', 100), 'EU: 843977')
('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1050.0), 'EU: 843977')
('TRANSFER', 'Brobdingnag', 'MyCountry', ('metalElements', 100), 'EU: 883576')
('TRANSFER', 'MyCountry', 'Brobdingnag', ('timber', 1050.0), 'EU: 883576')
Number of solutions: 500
Best solution EU: 888572
Best Path:
('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 567364')
('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 694040')
('TRANSFER', 'Atlantis', 'MyCountry', ('metalAlloys', 100), 'EU: 784670')
('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1100.0), 'EU: 784670')
('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 843316')
('TRANSFER', 'Atlantis', 'MyCountry', ('metalAlloys', 100), 'EU: 888572')
('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1100.0), 'EU: 888572')
Number of solutions: 1000
Best solution EU: 888572
Best Path:
('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 567364')
('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 694040')
('TRANSFER', 'Atlantis', 'MyCountry', ('metalAlloys', 100), 'EU: 784670')
('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1100.0), 'EU: 784670')

('TRANSFER', 'Brobdingnag', 'MyCountry', ('metalAlloys', 100), 'EU: 827217')
('TRANSFER', 'MyCountry', 'Brobdingnag', ('timber', 1100.0), 'EU: 827217')
('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 888572')

 

  -parameters:
    initial_state_filename = "./input_files/countries.xlsx"
    output_schedule_filename = "./output_files/random_d10.txt"
    depth = 10
    solution_limit = 1000
  -output:
    Number of solutions: 1
    Best solution EU: 567364
    Best Path:
    ('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 567364')
    Number of solutions: 5
    Best solution EU: 883576
    Best Path:
    ('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 567364')
    ('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 694040')
    ('TRANSFER', 'Atlantis', 'MyCountry', ('metalAlloys', 100), 'EU: 784670')
    ('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1100.0), 'EU: 784670')
    ('TRANSFER', 'Atlantis', 'MyCountry', ('metalElements', 100), 'EU: 843977')
    ('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1050.0), 'EU: 843977')
    ('TRANSFER', 'Atlantis', 'MyCountry', ('metalElements', 100), 'EU: 883576')
    ('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1050.0), 'EU: 883576')
    Number of solutions: 10
    Best solution EU: 916571
    Best Path:
    ('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 567364')
    ('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 694040')
    ('TRANSFER', 'Atlantis', 'MyCountry', ('metalAlloys', 100), 'EU: 784670')
    ('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1100.0), 'EU: 784670')
    ('TRANSFER', 'Atlantis', 'MyCountry', ('metalElements', 100), 'EU: 843977')
    ('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1050.0), 'EU: 843977')
    ('TRANSFER', 'Atlantis', 'MyCountry', ('metalElements', 100), 'EU: 883576')
    ('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1050.0), 'EU: 883576')
    ('TRANSFER', 'Atlantis', 'MyCountry', ('metalElements', 100), 'EU: 906815')
    ('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1050.0), 'EU: 906815')
    ('TRANSFER', 'Atlantis', 'MyCountry', ('metalElements', 100), 'EU: 916571')
    ('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1050.0), 'EU: 916571')
    Number of solutions: 50
    Best solution EU: 918949

Best Path:

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 567364')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 694040')

('TRANSFER', 'Atlantis', 'MyCountry', ('metalAlloys', 100), 'EU: 784670')

('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1100.0), 'EU: 784670')

('TRANSFER', 'Atlantis', 'MyCountry', ('metalElements', 100), 'EU: 843977')

('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1050.0), 'EU: 843977')

('TRANSFER', 'Atlantis', 'MyCountry', ('metalElements', 100), 'EU: 883576')

('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1050.0), 'EU: 883576')

('TRANSFER', 'Atlantis', 'MyCountry', ('metalElements', 100), 'EU: 906815')

('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1050.0), 'EU: 906815')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 916089')

('TRANSFER', 'Atlantis', 'MyCountry', ('metalAlloys', 100), 'EU: 918949')

('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1100.0), 'EU: 918949')

Number of solutions: 100

Best solution EU: 918949

Best Path:

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 567364')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 694040')

('TRANSFER', 'Atlantis', 'MyCountry', ('metalAlloys', 100), 'EU: 784670')

('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1100.0), 'EU: 784670')

('TRANSFER', 'Atlantis', 'MyCountry', ('metalElements', 100), 'EU: 843977')

('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1050.0), 'EU: 843977')

('TRANSFER', 'Atlantis', 'MyCountry', ('metalElements', 100), 'EU: 883576')

('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1050.0), 'EU: 883576')

('TRANSFER', 'Atlantis', 'MyCountry', ('metalElements', 100), 'EU: 906815')

('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1050.0), 'EU: 906815')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 916089')

('TRANSFER', 'Atlantis', 'MyCountry', ('metalAlloys', 100), 'EU: 918949')

('TRANSFER', 'MyCountry', 'Atlantis', ('electronics', 51.16279069767442), 'EU: 918949')

Number of solutions: 500

Best solution EU: 918949

Best Path:

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 567364')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 694040')

('TRANSFER', 'Atlantis', 'MyCountry', ('metalAlloys', 100), 'EU: 784670')

('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1100.0), 'EU: 784670')

('TRANSFER', 'Atlantis', 'MyCountry', ('metalElements', 100), 'EU: 843977')

('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1050.0), 'EU: 843977')
('TRANSFER', 'Atlantis', 'MyCountry', ('metalElements', 100), 'EU: 883576')
('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1050.0), 'EU: 883576')
('TRANSFER', 'Atlantis', 'MyCountry', ('metalElements', 100), 'EU: 906815')
('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1050.0), 'EU: 906815')
('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 916089')
('TRANSFER', 'Atlantis', 'MyCountry', ('metalAlloys', 100), 'EU: 918949')
('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1100.0), 'EU: 918949')
Number of solutions: 1000
Best solution EU: 918949
Best Path:
('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 567364')
('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 694040')
('TRANSFER', 'Atlantis', 'MyCountry', ('metalAlloys', 100), 'EU: 784670')
('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1100.0), 'EU: 784670')
('TRANSFER', 'Atlantis', 'MyCountry', ('metalElements', 100), 'EU: 843977')
('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1050.0), 'EU: 843977')
('TRANSFER', 'Atlantis', 'MyCountry', ('metalElements', 100), 'EU: 883576')
('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1050.0), 'EU: 883576')
('TRANSFER', 'Atlantis', 'MyCountry', ('metalElements', 100), 'EU: 906815')
('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1050.0), 'EU: 906815')
('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 916089')
('TRANSFER', 'Atlantis', 'MyCountry', ('metalAlloys', 100), 'EU: 918949')
('TRANSFER', 'MyCountry', 'Atlantis', ('electronics', 51.16279069767442), 'EU: 918949')

  -parameters:
    initial_state_filename = "./input_files/countries.xlsx"
    output_schedule_filename = "./output_files/random_d20.txt"
    depth = 20
    solution_limit = 1000
  -output:
    Number of solutions: 1
    Best solution EU: 567364
    Best Path:
    ('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 567364')
    Number of solutions: 5
    Best solution EU: 883576
    Best Path:
    ('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 567364')
    ('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 694040')

('TRANSFER', 'Atlantis', 'MyCountry', ('metalAlloys', 100), 'EU: 784670')
('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1100.0), 'EU: 784670')
('TRANSFER', 'Atlantis', 'MyCountry', ('metalElements', 100), 'EU: 843977')
('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1050.0), 'EU: 843977')
('TRANSFER', 'Atlantis', 'MyCountry', ('metalElements', 100), 'EU: 883576')
('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1050.0), 'EU: 883576')
Number of solutions: 10
Best solution EU: 916571
Best Path:
('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 567364')
('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 694040')
('TRANSFER', 'Atlantis', 'MyCountry', ('metalAlloys', 100), 'EU: 784670')
('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1100.0), 'EU: 784670')
('TRANSFER', 'Atlantis', 'MyCountry', ('metalElements', 100), 'EU: 843977')
('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1050.0), 'EU: 843977')
('TRANSFER', 'Atlantis', 'MyCountry', ('metalElements', 100), 'EU: 883576')
('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1050.0), 'EU: 883576')
('TRANSFER', 'Atlantis', 'MyCountry', ('metalElements', 100), 'EU: 906815')
('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1050.0), 'EU: 906815')
('TRANSFER', 'Atlantis', 'MyCountry', ('metalElements', 100), 'EU: 916571')
('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1050.0), 'EU: 916571')
Number of solutions: 50
Best solution EU: 918949
Best Path:
('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 567364')
('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 694040')
('TRANSFER', 'Atlantis', 'MyCountry', ('metalAlloys', 100), 'EU: 784670')
('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1100.0), 'EU: 784670')
('TRANSFER', 'Atlantis', 'MyCountry', ('metalElements', 100), 'EU: 843977')
('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1050.0), 'EU: 843977')
('TRANSFER', 'Atlantis', 'MyCountry', ('metalElements', 100), 'EU: 883576')
('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1050.0), 'EU: 883576')
('TRANSFER', 'Atlantis', 'MyCountry', ('metalElements', 100), 'EU: 906815')
('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1050.0), 'EU: 906815')
('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 916089')
('TRANSFER', 'Atlantis', 'MyCountry', ('metalAlloys', 100), 'EU: 918949')
('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1100.0), 'EU: 918949')
Number of solutions: 100
Best solution EU: 918949
Best Path:
('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 567364')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 694040')
('TRANSFER', 'Atlantis', 'MyCountry', ('metalAlloys', 100), 'EU: 784670')
('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1100.0), 'EU: 784670')
('TRANSFER', 'Atlantis', 'MyCountry', ('metalElements', 100), 'EU: 843977')
('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1050.0), 'EU: 843977')
('TRANSFER', 'Atlantis', 'MyCountry', ('metalElements', 100), 'EU: 883576')
('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1050.0), 'EU: 883576')
('TRANSFER', 'Atlantis', 'MyCountry', ('metalElements', 100), 'EU: 906815')
('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1050.0), 'EU: 906815')
('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 916089')
('TRANSFER', 'Atlantis', 'MyCountry', ('metalAlloys', 100), 'EU: 918949')
('TRANSFER', 'MyCountry', 'Atlantis', ('electronics', 51.16279069767442), 'EU: 918949')
Number of solutions: 500
Best solution EU: 918949
Best Path:
('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 567364')
('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 694040')
('TRANSFER', 'Atlantis', 'MyCountry', ('metalAlloys', 100), 'EU: 784670')
('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1100.0), 'EU: 784670')
('TRANSFER', 'Atlantis', 'MyCountry', ('metalElements', 100), 'EU: 843977')
('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1050.0), 'EU: 843977')
('TRANSFER', 'Atlantis', 'MyCountry', ('metalElements', 100), 'EU: 883576')
('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1050.0), 'EU: 883576')
('TRANSFER', 'Atlantis', 'MyCountry', ('metalElements', 100), 'EU: 906815')
('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1050.0), 'EU: 906815')
('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 916089')
('TRANSFER', 'Atlantis', 'MyCountry', ('metalAlloys', 100), 'EU: 918949')
('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1100.0), 'EU: 918949')
Number of solutions: 1000
Best solution EU: 918949
Best Path:
('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 567364')
('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 694040')
('TRANSFER', 'Atlantis', 'MyCountry', ('metalAlloys', 100), 'EU: 784670')
('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1100.0), 'EU: 784670')
('TRANSFER', 'Atlantis', 'MyCountry', ('metalElements', 100), 'EU: 843977')
('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1050.0), 'EU: 843977')
('TRANSFER', 'Atlantis', 'MyCountry', ('metalElements', 100), 'EU: 883576')
('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1050.0), 'EU: 883576')
('TRANSFER', 'Atlantis', 'MyCountry', ('metalElements', 100), 'EU: 906815')

('TRANSFER', 'MyCountry', 'Atlantis', ('timber', 1050.0), 'EU: 906815')
('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 916089')
('TRANSFER', 'Atlantis', 'MyCountry', ('metalAlloys', 100), 'EU: 918949')
('TRANSFER', 'MyCountry', 'Atlantis', ('electronics', 51.16279069767442), 'EU: 918949')

2. Equal Countries
-description: We wanted to see what would happen if every country had the exact same resources. Would they even interact if none had an advantage in anything? We gave each country an equal decent amount of each resource and allowed 4 levels of depth. The number of solutions is limited because, as shown in the previous example, utility plateaus. We found that the MyCountry actually performed transforms to produce metalElements, then traded those to another country for electronics. This was interesting because we weren't sure if the countries would interact. We believe if the other countries had the same transformations available, trades would not occur.
-initial state:

| Country | population | metal Elements | timber | land Area | water | metal Alloys | electronics | housing | food | metal Alloys Waste | housing Waste | electronics Waste | food Waste |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Atlantis | 15000 | 1200 | 6000 | 25000 | 50000 | 1200 | 1000 | 15000 | 18000 | 2000 | 1600 | 1400 | 1500 |
| Brobdingnag | 15000 | 1200 | 6000 | 25000 | 50000 | 1200 | 1000 | 15000 | 18000 | 2000 | 1600 | 1400 | 1500 |
| Carpania | 15000 | 1200 | 6000 | 25000 | 50000 | 1200 | 1000 | 15000 | 18000 | 2000 | 1600 | 1400 | 1500 |
| Dinotopia | 15000 | 1200 | 6000 | 25000 | 50000 | 1200 | 1000 | 15000 | 18000 | 2000 | 1600 | 1400 | 1500 |
| Erewhon | 15000 | 1200 | 6000 | 25000 | 50000 | 1200 | 1000 | 15000 | 18000 | 2000 | 1600 | 1400 | 1500 |
| MyCountry | 15000 | 1200 | 6000 | 25000 | 50000 | 1200 | 1000 | 15000 | 18000 | 2000 | 1600 | 1400 | 1500 |

-parameters:
initial_state_filename = "./input_files/equalCountries.xlsx"
output_schedule_filename = "./output_files/equal.txt"
depth = 4
solution_limit = 100000
-output:
Number of solutions: 1
Best solution EU: 538562
Best Path:
('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 538562')
Number of solutions: 5
Best solution EU: 1206122
Best Path:
('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 538562')
('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 969411')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 1187050')

('TRANSFER', 'Atlantis', 'MyCountry', ('metalElements', 100), 'EU: 1206122')

('TRANSFER', 'MyCountry', 'Atlantis', ('electronics', 48.83720930232558), 'EU: 1206122')

Number of solutions: 10

Best solution EU: 1206122

Best Path:

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 538562')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 969411')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 1187050')

('TRANSFER', 'Atlantis', 'MyCountry', ('metalElements', 100), 'EU: 1206122')

('TRANSFER', 'MyCountry', 'Atlantis', ('food', 1166.6666666666667), 'EU: 1206122')

Number of solutions: 50

Best solution EU: 1206122

Best Path:

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 538562')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 969411')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 1187050')

('TRANSFER', 'Brobdingnag', 'MyCountry', ('metalElements', 100), 'EU: 1206122')

('TRANSFER', 'MyCountry', 'Brobdingnag', ('electronics', 48.83720930232558), 'EU: 1206122')

Number of solutions: 100

Best solution EU: 1206122

Best Path:

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 538562')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 969411')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 1187050')

('TRANSFER', 'Brobdingnag', 'MyCountry', ('metalElements', 100), 'EU: 1206122')

('TRANSFER', 'MyCountry', 'Brobdingnag', ('food', 1166.6666666666667), 'EU: 1206122')

Number of solutions: 500

Best solution EU: 1206122

Best Path:

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 538562')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 969411')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 1187050')

('TRANSFER', 'Erewhon', 'MyCountry', ('metalElements', 100), 'EU: 1206122')

('TRANSFER', 'MyCountry', 'Erewhon', ('food', 1166.6666666666667), 'EU: 1206122')

Number of solutions: 1000

Best solution EU: 1206122

Best Path:

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 538562')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 969411')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 1187050')

('TRANSFER', 'Dinotopia', 'MyCountry', ('metalElements', 100), 'EU: 1206122')

('TRANSFER', 'MyCountry', 'Dinotopia', ('food', 1166.6666666666667), 'EU: 1206122')

Number of solutions: 100000

Best solution EU: 1206122

Best Path:

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 538562')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 969411')

('TRANSFER', 'Dinotopia', 'MyCountry', ('metalElements', 100), 'EU: 1025555')

('TRANSFER', 'MyCountry', 'Dinotopia', ('electronics', 48.83720930232558), 'EU: 1025555')

('TRANSFORM', 'MyCountry', (('population', 320), ('metalElements', 64), ('timber', 320), ('metalAlloys', 192), ('landArea', 64)), (('population', 320), ('housing', 64), ('housingWaste', 64)), 'EU: 1206122')