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## **2°C** ENERGY TRANSITION

2 °C is a cooperative game in which you have the common aim of replacing all coal-fired power plants and one nuclear plant with power plants based on renewable energy. Your task is to realise the energy transition and cover the demand for electricity at the same time – not an easy balance to strike. The clock is ticking, as both coal-fired power plant operation and non-compliance with the climate goals accelerate climate change: the global temperature is rising. Get together to prevent it from reaching the 2-degree tipping point!



### uwid \*

This game was developed by students in the Industrial Design course at the University of Wuppertal as part of the project "Perspectives in Play", which has been funded by the German Federal Foreign Office. The project aims to develop games that turn different aspects of politics into an interactive experience. You will find all the games in the series at **www.perspectives-in-play.com**. For more information on the German Federal Foreign Office and its programmes, please visit **www.diplo.de/aussenpolitiklive**.



# CONTENTS

The board consists of 21 fields and can simply be printed out and used or modified according to individual needs. The coin trays used to indicate your energy and profit production are ready to use without cutting out. The remaining components of the game must be cut out and folded or put together in some cases. Print on one side only.

Cut

\_\_\_\_\_ Fold

## INCLUDED



20 cards





1 board with 21 fields



2 coin trays: Energy + Profit



1 thermometer (two-part)

43 power plants, 1 price list, 1 calculation table (2 pages)

### REQUIRED





🔵 1 coin

#### Board

Twenty-one hexagonal fields combine to form your board. You can use the print & play template without cutting anything out or cut out the individual fields and rearrange them each time you play.

## 

#### Starting field

The field with the compass is your starting field. The compass shows the cardinal points. It is important when you draw a weather action card that sets up the power plants in a specific compass direction.



#### **Power plants**

There are six coal-fired, one nuclear, and 36 renewable-energy power plants in three expansion phases. The numbers above the renewable-energy plants indicate their expansion phase. When building, always start with phase 1. You can raise the phase numbers via upgrades. The values below the power plants indicate how much total energy (left) and profit (right) the relevant phase generates.



#### Cards

There are two types of cards.

- **Start cards:** You begin the game with one of these.
- Action cards: You draw them in the course of the game.





#### Thermometer

The thermometer comes in two parts: the slide and the temperature indicator. You show the level of the current temperature increase using the thermometer. At the beginning, it is 0 °C and under certain conditions it rises. If it reaches 2 °C, the game is over!



#### Coin trays: Profit and Energy

With the markers (see next page), you show how much profit and energy your power plants generate each round. Move the marker accordingly as soon as the production values change (e.g., after dismantling, expanding, an upgrade or action).

	ENERGY								1							
0	1	2	3	4	5	6	7	8	9							
10	11	12	13	14	15	16	17	18	19							
20	21	22	23	24	25	26	27	28	29							
30	31	32	33	34	35	36	37	38	20	<u> </u> Р	RO	FIT				
40	41	42	43	44	45	46	D	100	200	300	400	500	600	700	800	900
50	51	52	53	54	55	56	1,000	0 1,100	1,200	1,300	1,400	1,500	1,600	1,700	1,800	1,900
60	61	62	63	64	65	66	2,000	0 2,100	2,200	2,300	2,400	2,500	2,600	2,700	2,800	2,900
70	71	72	73	74	75	76	3,000	0 3,100	3,200	3,300	3,400	3,500	3,600	3,700	3,800	3,900
80	81	82	83	84	85	86	4,00	0 4,100	4,200	4,300	4,400	4,500	4.600	4,700	4,800	4,900
							5,00	0 5,100	5,200	5,300	5,400	5,500	5,600	5,700	5,800	5,900



Marker: Demand Use it to show how high the population's demand for energy is.



Marker: Production Use it to show how much energy your power plants generate.



Marker: Profit Use it to show how much money you earn with your power plants.



#### **Price list**

The list contains information on the power plants. For the relevant power plants, it shows the costs of dismantling, building/expanding, and upgrades, and the amount of energy and profit they generate. When a renewable-energy power plant is upgraded to the next phase, consult the list to see the levels of profit and energy production increases.

## CALCULATION

CURRENT SUM	+/-

#### **Calculation table**

Use the table to write down how much money you currently have.



#### Additional material: Pencil and coins

Use the pencil to post amounts in the calculation table. The coin is used if you draw a nuclear power plant card (see p. 10).

## PREPARATION

#### 1a) Setting up the board: Easy

Begin to prepare your board. To do so, you can use the print template without cutting out the fields.

#### 1b) Setting up the board: Custom

Alternatively, you can cut out each field, then design and set up your own board. Make sure that the starting field is located at the centre and each field is connected to at least one neighbouring field via one route.

## 2. Setting up the coal-fired and nuclear power plants

After setting up the board, place the coal-fired power plants and the nuclear power plant randomly on the fields with the white dots, one plant per field.

#### 3. Shuffling the cards

Shuffle the start cards and action cards separately. Place the shuffled cards in two piles, face down.









#### 4. Preparing the coin trays

Put the markers for Demand, Production, and Profit on the matching fields with the box outlined in bold. You start the game with these values.



## **SELECT YOUR ROLE**

Each of you picks a playing piece (engineer or scientist) and put is on the starting field. If there are only two players, each player picks two playing pieces.

#### Engineer

As engineers, you have the ability to develop renewable energy sources. You travel across the board to where you want to build. You can only locate the relevant building on a field with a matching element symbol (sun/wind/water). For example, solar cells can only be built on a field with the sun symbol (see right).



#### **Scientist**

As scientists, you have the ability to upgrade power plants with renewable energy sources. This makes them more efficient and they can generate more energy and profit. To do this, you have to travel across the board to the power plant you want to upgrade.



## GAMEPLAY

Pick a starting player. You make your move in turn, going clockwise.

Draw a start card to begin. It poses the first challenge that you have to master together. You have three rounds to do so, which is your "action period". A round is over after each playing piece has made a move. After completing the third round, the action ends and you determine the result. Continue playing until the condition for ending the game is fulfilled (see p. 12).







### **START!**

Each of you is paid 1,500 () before starting. Now it's time to play!

## YOUR MOVE











Two steps

Dismantle

Special ability

Quick trip + one action

Lose turn

In his/her move, each player carries out **one** of these five actions:

- · Move one playing piece by up to two fields in one direction
- · Dismantle a power plant
- · Use 1x role ability (engineers build, scientists upgrade)
- Take a quick trip and perform one other action before or after the trip (Caution:
   Each quick trip means a temperature rise of 0.1 °C!)
- · Lose turn



At the beginning of each round, you are paid your profit according to your power plant's output. Move the profit marker to the relevant field.

## END OF THE ACTION PERIOD



After the third round, check whether you have met the card's requirements. If not, the temperature rises by the value under "Climate penalty". Move the slide on the thermometer accordingly.



If you were unable to cover the population's energy demands, you must offset the difference from your budget as you will have to import power to cover the demand.



Further, each coal-fired power plant that exists at the end of the action period means a temperature increase of 0.1 °C per power plant.

## SUBSEQUENT ROUNDS



Continue the game the same way with one difference: you draw an action card at the beginning of the round instead of a start card. Your action period is three rounds again. If you cannot meet the climate target specified (example: You need to dismantle two coal-fired power plants but there are none left in the game), draw a new card and discard the other one.



If you draw a weather event card, turn the affected power plant face down. This shows it has been decommissioned. After the action period ends, turn it face up to recommission it.



If you draw *anuclear* power action card, you either have to dismantle the nuclear power plant during the current action period or leave it alone. If you choose

to leave it, toss a coin twice at the end of the round to determine whether or not the nuclear power plant has a meltdown (heads twice in a row). If meltdown wins, you lose the game immediately.

# GAME OVER

YOU WIN...



If all coal-fired power plants and the nuclear plant have been dismantled and you were able to cover the population's latest demand for energy.

## YOU LOSE...







- When the temperature reaches 2 °C or
- · You have a negative balance after paying the energy import costs or
- The nuclear power plant has a meltdown.

START CARD A climate goal was set. In the action period, two coal-fired power plants must be dismantled. The population's energy demand is currently 38. b Merror b Meror b Meror b Meror b Merror b Merror b Mero	START CARDA climate goal was set.In the action period, two renewable-energy power plants must be built.The population's energy demand is currently 38 Energy import costs:energy import costs:<	START CARD A climate goal was set. In the action period, two renewa- ble-energy power plants must be built. The population's energy demand is currently 38 §. Energy import costs: -800 () Climate penalty: +0.2 °C	START CARD A climate goal was set. In the action period, <b>one coal-fired</b> <b>power plants</b> must be dismantled and <b>one renewable-energy power plant</b> must be built. The population's <b>energy demand</b> is currently <b>38</b> %. Energy import costs: -700 () Climate penalty: +0.2 °C
<section-header><section-header><text><text><text><text><text><text></text></text></text></text></text></text></section-header></section-header>	<section-header><section-header><text><text><text><text><text></text></text></text></text></text></section-header></section-header>	ACTION CARD       Image: Construction operiod, two renewas be-energy power plants must be ugraded.         Marge demand rise:       * 15 %         Marge demand rise:       * 1000 (%)         Marge menalty:       * 0.40 °C	ACTION CARD   A climate goal was set.   In the action period, two   renewable-energy power plants must   be built or upgraded.   Energy demand rise:   +4    Energy import costs:   -900    Climate penalty:   +0.4 °C

ACTION CARD A climate goal was set. In the action period, two renewable-energy power plants must be built. Mergy demand rise: +3 ? Mergy import costs: +3 ? Climate penalty: +0.6 °C	ACTION CARD A climate goal was set. In the action period, <b>two coal-fired power plants</b> must be dismantled. Energy demand rise: +5 5 Energy import costs: -1,200 () Climate penalty: +0.4 °C	<section-header><section-header><text><text><text><text><text><text></text></text></text></text></text></text></section-header></section-header>	ACTION CARD Storm warning! A hurricane is expected to hit the west. Such strong winds can damage wind parks, so they must be shut down preventively. For this period, the westernmost wind park generates neither power nor profit. Energy demand rise: +4 § Energy import costs: -700 ()
ACTION CARD The weather has changed. Due to climate change, the south is experiencing a drought. The temperature has reached a new high and there's no rain in sight. For this period, the southermost water-powered plant generates neither power nor profit. Energy demand rise: +4 For energy import costs: -600	ACTION CARD The weather has changed. Due to climate change, the east is experiencing a drought. The temperature has reached a new high and there's no rain in sight. For this period, the easternmost water-powered plant generates neither power nor profit. Energy demand rise: +3 § Energy import costs: -800 ()	ACTION CARD   The weather has changed.   Thick clouds cover the sky in the east for weeks.   For this period, the easternmost solar system generates neither power nor profit.   Energy demand rise: for	ACTION CARD A climate goal was set. In the action period, one renewable-energy power plant must be built and another gets an upgrade. Energy demand rise: +0 Energy import costs: -1,200 Climate penalty: +0.4 °C





## PRICE LIST

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		COAL AND NUCLEAR POWER					
Level 1							
Building costs	-1,000 🛈	Dismantling costs	-200 🜔				
Energy / Profit	3 🕅 100 🛈						
Level 2							
Upgrade costs	-1,300 ()						
Energy / Profit	+2 9⁄ +100 ()						
Level 3							
Upgrade costs	-1,800 ()						
Energy / Profit	+2 1⁄2/ +200 ()						
			•				

**POWER PLANTS** 



	PROFIT									
	0	100	200	300	400	500	600	700	800	900
1,	,000	1,100	1,200	1,300	1,400	1,500	1,600	1,700	1,800	1,900
2	,000	2,100	2,200	2,300	2,400	2,500	2,600	2,700	2,800	2,900
3	,000	3,100	3,200	3,300	3,400	3,500	3,600	3,700	3,800	3,900
4	,000	4,100	4,200	4,300	4,400	4,500	4,600	4,700	4,800	4,900
5	,000	5,100	5,200	5,300	5,400	5,500	5,600	5,700	5,800	5,900

Can be cut out as required.

	ENERGY									
0	1	2	3	4	5	6	7	8	9	
10	11	12	13	14	15	16	17	18	19	
20	21	22	23	24	25	26	27	28	29	
30	31	32	33	34	35	36	37	38	39	
40	41	42	43	44	45	46	47	48	49	
50	51	52	53	54	55	56	57	58	59	
60	61	62	63	64	65	66	67	68	69	
70	71	72	73	74	75	76	77	78	79	
80	81	82	83	84	85	86	87	88	89	

Can be cut out as required.

# CALCULATION

CURRENT AMOUNT	+ / -

# CALCULATION

CURRENT AMOUNT	+ / -

## WE WANT YOUR FEEDBACK!

We would be pleased to receive your feedback on this game, including any ideas or suggestions. Simply send your answers and other feedback (as a scan, photo, etc.) to **feedback@perspectives-in-play.com**.

Which game did you play?				
		Age	Gender	
Who played it with you?	Player 1			
	Player 2			
	Player 3			
	Player 4			
	(Continue if more.)			
How long did it take to prepare fo	or the game?		minutes	
How long did it take to play the g	ame?		minutes	
What did you like about the game	?			

Which aspects could we improve upon?

#### On a scale of 1 to 5, to what extent do you agree with the following statements?

	'l do not agree at all	'I completely agree.'				
'I am interested in politics.'	1	2	3	4	5	
'Politicians do not have an easy time of it.'	1	2	3	4	5	
'Politics play an important role in my everyday life.'	1	2	3	4	5	

What insights did you gain into politics when playing the game? What thoughts related to politics did you have while playing?

What topics can you envision for future games of this type?

Thank you very much for your contribution!

Your

Perspectives in Play Team