

Smart strategies for the transition in coal intensive regions

Project No: 836819



Blueprint on Bulgaria's South-East region energy transition

WP 6 – Task 6.4 / D6.5

July 2022

Authors: Angel Nikolaev, Black Sea Energy Research Centre, Bulgaria

Editors: Charalampos Malamatenios, Centre for Renewable Energy Sources and Saving, Greece
Rita Mergner, WIP Renewable Energy, Germany
Rainer Janssen, WIP Renewable Energy, Germany

Contact: Black Sea Energy Research Centre
Angel Nikolaev
Email: office@bserc.eu
Tel: +359 2 9806854
7, Viktor Grigorovich Str.
1606 Sofia, Bulgaria
www.bserc.eu



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 836819. The sole responsibility for the content of this report lies with the authors. It does not necessarily reflect the opinion of the European Union. Neither the INEA nor the European Commission are responsible for any use that may be made of the information contained therein.

TRACER website: www.tracer-h2020.eu

Contents

<i>Executive summary</i>	<i>5</i>
<i>1 South-East Region common vision statement</i>	<i>5</i>
<i>2 South-East Region's projection of the energy mix</i>	<i>5</i>
<i>3 South-East Region's available options meeting the planned energy transition</i>	<i>7</i>
<i>4 South-East Region's high priority measures and concrete actions</i>	<i>8</i>
<i>5 References</i>	<i>10</i>
<i>ANNEX - Bulgaria South-East Region Blueprint Benchmark</i>	<i>11</i>

List of Figures

Figure 1: Projection of (a) the installed capacities (MW) and (b) electricity generation (TWh) in SER	7
Figure 2: Methodology for the identification of retraining needs	8

List of Tables

Table 1: Projection of the installed capacities and generation in SER.....	6
Table 2: Measures and actions to support R&I in SER	8
Table 3: Measures and actions to support workforce reskilling in SER	9

Abbreviations

CHP	combined heat and power
GDP	gross domestic product
GWh	gigawatt hour
MW	Megawatt
NECP	National Energy and Climate Plan of Bulgaria
PV	photovoltaic
R&I	research and innovation
RES	renewable energy sources
SER	South-Eastern Region in Bulgaria
TWh	Terawatt hour
VET	Vocational education and training
WBL	Work-based learning

Executive summary

Blueprints are key documents, which are detailed description of a process planning/development and implementation over time.

The current blueprint outlines the concrete actions that the public authorities, businesses, researchers, and other stakeholders need to take to adapt to trajectory consistent with the planned energy transition of South-eastern region (SER) in Bulgaria.

The SER (NUTS 2 region), being the host of Maritsa East coal complex - the biggest energy complex in South-Eastern Europe, will be the Bulgarian region that is the most affected by the energy transition, thus, it is in the greatest need of planning of all transition aspects, including energy and other economic sectors, social, employment, and environmental. The planning involved numerous stakeholder consultations, data collection, analyses, and development of policies, measures, and concrete actions, specifying responsibilities, time-frame, and others.

The current report is mainly based on previous work in TRACER project, dedicated to SER's transition, namely: energy projections until 2050 (TRACER D6.1, 2021); research and innovation (R&I) strategy and roadmap (TRACER D6.2, 2022 and TRACER D6.4, 2022); and workforce retraining needs assessment and roadmap (TRACER D6.3, 2022).

Chapter 1 provides an overview of the vision for the region. Chapter 2 presents a summary of the energy (with a focus on electricity) mix projection. Chapter 3 makes an overview of the transition's targets and approaches. Finally, Chapter 4 specifies the concrete planned measures and actions.

1 South-East Region common vision statement

The vision of SER is to attract investments to develop diversified climate-neutral economy and achieve high quality of life for its citizens.

2 South-East Region's projection of the energy mix

The National Recovery and Resilience Plan (CoM, 2022) specifies 2038 as an indicative coal phase-out year. Due to economic and environmental reasons, the coal use for electricity generation is expected to substantially decrease in the next several years and after that the capacities are expected to operate only during peak (high price) hours.

Coal briquettes are currently used in 2 district heating companies and in a small number of households in SER, but their use is expected to practically cease before 2030 (Mihaylov T., 2021).

Natural gas has a minor role in heat and electricity generation in the region. The draft Sustainable Energy Development Strategy of the Republic of Bulgaria (ME, 2021) and the NECP (ME, 2020) expect increased gasification in households, industry and service sectors until 2030 and beyond, but in the light of the recent increase in gas prices and geopolitical risks associated with gas imports, these expectations are highly uncertain.

Wind power capacity in SER has relatively low technical potential in the region and only moderate increase is expected by 2030, but after that a sharp increase is projected, taking advantage of less windy areas (TRACER D6.1, 2021).

The southern part of SER, in which Maritsa East lignite complex is located, has significant solar energy potential and large-scale solar PV plants are an excellent opportunity for the post-mining development of the Maritsa East area. The large-scale solar PV capacity in SER, amounting to 421 MW in 2020, is projected to triple by 2030 and further develop by 2050

(TRACER D6.1, 2021). Additionally, domestic solar PV and solar thermal installations are expected to substantially develop, in line with the planned stimuli (CoM, 2022a).

According to the NECP, in Bulgaria, both the electricity and heat production from biomass will grow during the period 2020-2030 and most of that growth would come from the newly built biomass CHP plants. Biomass is expected to have a declining share in individual heating in SER, as users are expected to switch to cleaner and more comfortable alternatives.

No new hydropower generation capacity is expected in SER, as almost the entire technical potential is utilized (Mihaylov T., 2021).

Large battery storage projects are planned in SER, where the batteries are produced on the territory of Maritsa East complex (CoM, 2022a).

According to the NECP (ME, 2020), Bulgaria intends to enable the integration of hydrogen in its energy and mobility systems. The expected annual final hydrogen consumption is 34 GWh in 2030 and 256 GWh in 2040, all of which would be in the transport sector.

Another important development until 2050 is the energy end-use efficiency, expected to be driven by stringent building codes, high energy prices, improved technologies, and stimuli.

The projected development of electricity capacities (MW) and electricity generation (TWh) in SER is shown in Table 1 and Figure 1 below.

Table 1: Projection of the installed capacities and generation in SER

	Electricity capacity, MW				Electricity generation, TWh			
	2020*	2030**	2040**	2050**	2020*	2030**	2040**	2050**
coal	3,534	3,214	0	0	11.1	3.9	0.0	0.0
gas	40	297	297	297	0.3	1.6	1.6	1.6
hydro	57	57	57	57	0.1	0.1	0.1	0.1
solar	421	1,262	1,544	1,826	0.6	1.8	2.4	3.0
wind	121	215	707	1,200	0.2	0.4	1.4	2.5
biogas	21	73	73	73	0.0	0.1	0.1	0.1
Total	4,194	5,118	2,678	3,453	12.3	7.8	5.5	7.3

* Source for 2020 hydro, solar, wind, biogas capacities and generation: SEDA, 2021

** Source for 2030 capacities & generation and 2040-2050 trends: TRACER D6.1, 2021

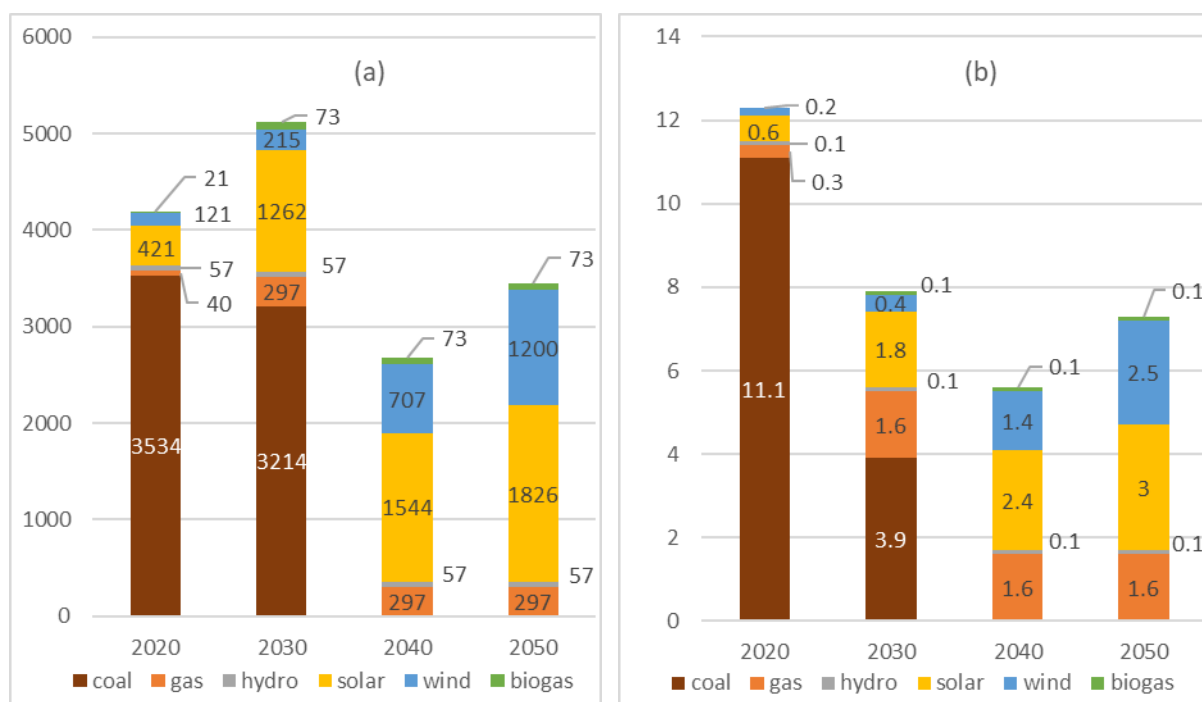


Figure 1: Projection of (a) the installed capacities (MW) and (b) electricity generation (TWh) in SER

3 South-East Region's available options meeting the planned energy transition

The coal phase-out needs to take place gradually until 2038, in order to avoid economic, social (including unemployment), and energy shocks. It is urgent to adopt a national policy in this regard to secure the transition predictability, which is necessary for the planning of the existing and new businesses, education, research, reskilling, infrastructure development, and related regulatory and funding frameworks.

The coal phase-out is expected to have a negative impact on 11,600 - 16,000 jobs till 2026, another about 6,300 jobs till 2030, and 14,800 - 18,000 more jobs till 2038.

The initial estimations conducted as a part of consultancy service for the preparation of the Territorial Just Transition Plans state that 23.8% of the total employment in Stara Zagora district will be affected by the Just Transition processes (PwC, 2021). The study proved that the intermittent renewable electricity generation in SER, combined with electricity storage and/or green hydrogen production, are among the most promising sectors that will experience labour shortages, especially after 2030. Both technologies have significant potential for development in the region in terms of job creation and retraining opportunities. Because of the predicted high intermittent capacities in the near future, it is likely that a large proportion of the batteries produced will be installed in the Maritsa East energy complex, which will require a highly skilled workforce (PwC, 2021).

When the total number of new jobs created as a result of the RES and energy efficiency development is weighed against the jobs potentially lost as a result of the region's slow coal phase-out process, it becomes clear that a major shock is unlikely to happen. For example, in 2030, the newly created (clean) energy jobs are estimated at about 10,000 and in 2050 – at about 11,500. The most job-intensive sector is energy end-use efficiency, such as building renovation (see more details in Annex). Moreover, several factors will alter the employment environment in the SER, such as migration and retirement patterns of workers, which will make it easier to bridge the gap between new jobs created and jobs lost. In addition, if managed effectively, the expanding renewable energy sector would attract a large number of

professionals who are willing to relocate because of the strong employment offer (TRACER D6.3, 2022).

A methodology to identify the retraining needs of the population in SER engaged in the lignite sector was the creation of transition profiles that will enable coal workers to transit smoothly from the coal industry to the RES sector. To this end, occupation profiles of former coal workers need to be matched with the most relevant occupations in the RES sector based on skills.

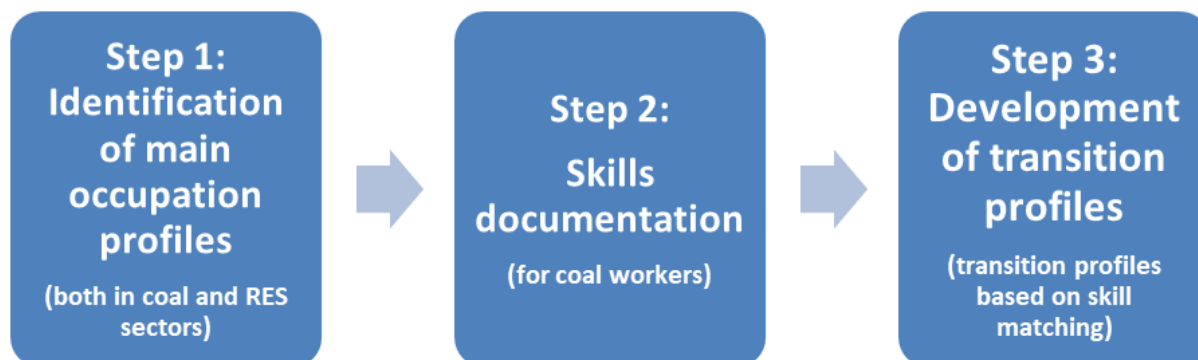


Figure 2: Methodology for the identification of retraining needs. Source: RES-SKILL, 2021

Transition profiles of SER's coal workers were identified by applying the above methodology (TRACER D6.3, 2022, RES-SKILL, 2021).

There are ongoing discussions about the opportunity to produce hydrogen and battery technologies locally. The potential benefits are many – employment, regional GDP and competitiveness, attraction of foreign investments, etc. Production of such innovative technologies, however, would require strengthening of the education and research and innovation potential in the region.

The Ministry of Energy has approved a project for the release of the concession area, liquidation, reclamation, including activities and costs for the removal of facilities, technical and biological reclamation. The objective is to provide as much as possible technical reclamation for use of land for forestry and agriculture. Additionally, there are plans for construction of two artificial lakes (TRACER, D3.3, 2020).

The potential for electricity and heat generation from solar radiation in the post-mining land in Maritza East complex is very high (over 1500 kWh/m²/year). Land for solar PV is available, but its utilisation depends on its preparation (TRACER, D3.3, 2020). It is likely to build large-scale solar PV plant on the post-mining land, although no such a decision has been taken yet.

4 South-East Region's high priority measures and concrete actions

To support the transition to low-carbon energy, a Roadmap for Research & Innovation (R&I) and Workforce reskilling has been elaborated for SER (TRACER, D6.4, 2022). The below tables summarise the measures, actions under each measure, and implementation timeframe.

Table 2: Measures and actions to support R&I in SER (Source: TRACER, D6.4, 2022)

Measure	Actions	Timeframe
Establishment of a favourable legislative framework for R&I promotion	Legislative improvements in R&I in clean energy	2023 - 2030
	Provision of financial incentives in R&I in clean energy	2023 - 2030

Measure	Actions	Timeframe
	Promotion of RES utilization and development	2023 - 2050
Creation of a direct link between the R&I bodies, academia, business and society	Boosting the link between the regional and national research ecosystems	2023 - 2030
	Linking R&I community with business and society	2023 - 2050
Creation of public R&I laboratories & crowding-in effect from public support	Establishment of public laboratories to boost public R&I	2023 - 2030
	Boosting public support to private R&I	2023 - 2050
Investment incentives for promotion of R&I in the business sectors	Introduction of financial incentive schemes for R&I public entities to support businesses	2023 - 2050
	Introduction of financial incentive schemes for R&I private entities	2030 - 2050
Conceptualising and facilitating R&I through capacity building	Capacity building for R&I entities - workshops, peer reviews, exchange of good practices	2023 - 2050
Exchange Programmes among partnering universities/institutes	Establishment of exchange programmes for doctoral students and post-doctoral researchers	2023 - 2050
Promotion of R&I results to boost societal support and increase number of researchers	Design of an awareness campaign to promote R&I results – develop a communication strategy and awareness campaign	2023 - 2050

Table 3: Measures and actions to support workforce reskilling in SER (Source: TRACER, D6.4, 2022)

Measure	Actions	Timeframe
Develop a regional education system linked to the market demand, region's potential, developed technologies and workforce specifics	Establishing a network of VET centres specialized on ex-coal workers in the affected region	2022-2050
Design of tailor-made training programmes for ex-workers of the mines and power plants	Development of a novel curriculum & tailored training content to facilitate coal workers' reorientation	2022-2025
	Support VET providers to integrate the learning materials into their VET & WBL offerings	2022-2025
Recognition for skills, knowledge and experience gathered in the coal industry	Facilitated procedure for recognition of experience-based skills and knowledge from the coal sector	2022-2030
Creating financial incentives to reskill or upskill through dedicated social policy in the sector	Distribution of pre-paid vouchers for retraining courses for career reorientation in the energy sector	2022-2025
	Distribution of pre-paid vouchers for retraining courses for career reorientation outside the energy sector	2022-2050
Incentives for businesses employing retrained workers from the coal sector	Financial tools in support of employers for hiring retrained workers from the coal sector	2022-2030
	Facilitated hiring procedures for ex-coal workers	2022-2050
Boosting the work-based learning methodology	Improved cooperation between VET providers & businesses to provide opportunities that will enable coal workers to transition	2022-2050
	Financial tools to cover expenses for work-based learning	2022-2050
Supported internships and practices	Implementing specialized internships for ex-coal employees	2022-2030
	Financial instruments to pay the internships	2022-2050
	Scholarships for ex-coal workers	2022-2050

Measure	Actions	Timeframe
Capacity building for public administration for facilitating the process of workforce reskilling/upskilling	Training of the administration to deal with people from the coal sector in a process of reskilling	2022-2050
	Establishing a department in each of the affected municipalities that takes care for employees in the process of career reorientation	2022-2030
Establishing a functioning informational system for the ex-coal workers for career reorientation, quitting the job, social benefits, self-employment initiatives etc.	Creating a database with all relevant data necessary for career reorientation	2022-2050
	Creating the software to support ex-coal workers	2022-2050
	Promoting the service for administrative support of ex-coal workers	2022-2025
Facilitating the informational flow about vacancies and job seekers	Regular communication with employers	2022-2050
	Regular communication with job/training seekers	2022-2050
	Regular conduction of Info-days, open days, career fairs	2022-2050

5 References

- COM (2022) NATIONAL RECOVERY AND RESILIENCE PLAN OF REPUBLIC OF BULGARIA. - COUNCIL OF MINISTERS, BULGARIA, FINAL VERSION FROM 6TH APRIL 2022;
[HTTPS://WWW.NEXTGENERATION.BG/UPLOAD/67/BG+ FINALRRP+2022-04-06-08-30+%28-TCA-%29.PDF](https://www.nextgeneration.bg/upload/67/BG+FINALRRP+2022-04-06-08-30+%28-TCA-%29.PDF)
- MIHAYLOV T. (2021) PERSONAL INTERVIEW WITH MR. TODOR MIHAYLOV, ENERGY EXPERT, HELD ON 19TH FEBRUARY 2021.
- MINISTRY OF ENERGY (ME) (2020) INTEGRATED ENERGY AND CLIMATE PLAN OF THE REPUBLIC OF BULGARIA 2021–2030
[HTTPS://EC.EUROPA.EU/ENERGY/SITES/ENER/FILES/DOCUMENTS/BG_FINAL_NEC_P_MAIN_EN.PDF](https://ec.europa.eu/energy/sites/ener/files/documents/bg_final_necp_main_en.pdf)
- MINISTRY OF ENERGY (ME) (2021) STRATEGY FOR SUSTAINABLE ENERGY DEVELOPMENT OF REPUBLIC OF BULGARIA UNTIL 2030 WITH HORIZON UNTIL 2050. DRAFT VERSION, UNDER PUBLIC CONSULTATION.
- PWC (2021), ASSISTANCE IN THE PREPARATION OF TERRITORIAL PLANS FOR A FAIR TRANSITION IN REPUBLIC OF BULGARIA - STARA ZAGORA REGION
- RES-SKILL PROJECT (2021), SKILLS MATCHING ANALYSIS AND DEVELOPMENT OF TRANSITION PROFILES, WWW.RES-SKILL.EU
- SEDA – SUSTAINABLE ENERGY DEVELOPMENT AGENCY (2021) DATABASE FOR RENEWABLE ENERGY BY DISTRICTS. [HTTPS://PORTAL.SEEA.GOVERNMENT.BG/BG/ENERGYBYREGIONANDRIP](https://portal.seea.government.bg/bg/energybyregionandrip)
- TRACER D3.3 (2020) REPORT ON THE ENVIRONMENTAL IMPACTS AND SUSTAINABLE RECLAMATION SOLUTIONS IN NINE COAL REGIONS. TRACER PROJECT No.836819 - SMART STRATEGIES FOR THE TRANSITION IN COAL INTENSIVE REGIONS/MARCH 2020
- TRACER D6.1 (2021) PROJECTIONS FOR THE TRANSITION TO 2030 / 2050 IN THE TARGET REGIONS – DELIVERABLE 6.1/ HORIZON 2020 TRACER PROJECT No.836819 - SMART STRATEGIES FOR THE TRANSITION IN COAL INTENSIVE REGIONS/MAY 2021
- TRACER D6.2 (2022) RESEARCH AND INNOVATION STRATEGY IN THE FIELD OF ENERGY FOR SOUTHEAST REGION, BULGARIA – DELIVERABLE 6.2/ HORIZON 2020 TRACER PROJECT No.836819 - SMART STRATEGIES FOR THE TRANSITION IN COAL INTENSIVE REGIONS/APRIL 2022
- TRACER D6.3 (2022) REPORT ON THE NEEDS FOR WORKFORCE RETRAINING – DELIVERABLE 6.3/ HORIZON 2020. TRACER PROJECT No.836819 - SMART STRATEGIES FOR THE TRANSITION IN COAL INTENSIVE REGIONS/MARCH 2022
- TRACER D6.4 (2022) ROADMAP FOR THE SOUTHEAST REGION, BULGARIA– DELIVERABLE 6.4/ HORIZON 2020. TRACER PROJECT No.836819 - SMART STRATEGIES FOR THE TRANSITION IN COAL INTENSIVE REGIONS/MARCH 2022

ANNEX - Bulgaria South-East Region Blueprint Benchmark

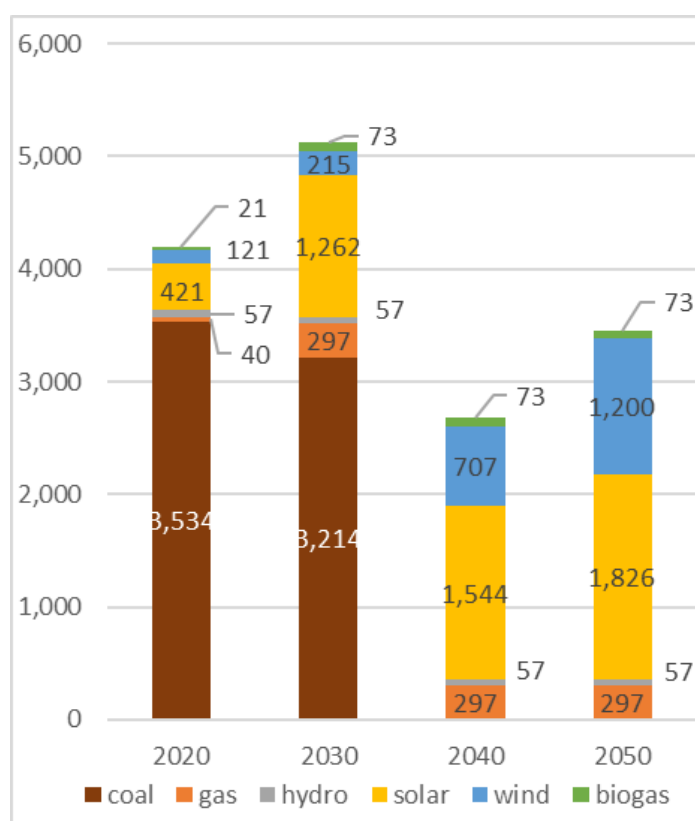
BULGARIA

South-East Region (BG34)

	2021
SURFACE (km ²)	22,369
POPULATION (inhabitants)	1,397,435
GDP PER CAPITA (EUR)	6,226



	2021
DIRECT EMPLOYMENT IN THE COAL INDUSTRY (pers.)	11,000 (est.)
UNEMPLOYMENT RATE (%)	5.4



TIME LINE OF SOUTH EAST REGION'S ENERGY MIX FORECASTING (MW)

JOB CREATION POTENTIAL DURING THE DECARBONISATION PROCESS

TOTAL ESTIMATED FULL TIME EQUIVALENT JOBS	HYDROGEN	WASTE INCINERATION	SOLAR PV	WIND	BIOMASS	ENERGY EFFICIENCY
In 2030	34	67	1,955	282	11	7,460
In 2050	108	67	2,828	1,049	11	7,460