London Economics International LLC

Concept for the Central Asia Regional Economic Cooperation ("CAREC") Energy Reform Atlas

Prepared for:
The Asian Development Bank ("ADB")

A.J. Goulding

Agenda

1	**Overview of the Atlas and guiding principles**
	Survey of sample website layouts
2	Envisioned Atlas structure and navigation
	Geographical navigation
	Topical navigation
3	Additional suggestions for website features

The Atlas will be the online delivery vehicle for the Tariff Reform Toolkit and Manual on Unbundling, and other reports

Goals of the CAREC Energy Reform Atlas

To serve as a <u>virtual toolkit</u> containing practical guides on tariff reform, unbundling of state-owned enterprises, and the protection of vulnerable customers

To curate a <u>library of content</u> and knowledge, with hands-on answers to the typical dilemmas policymakers face during the reform process
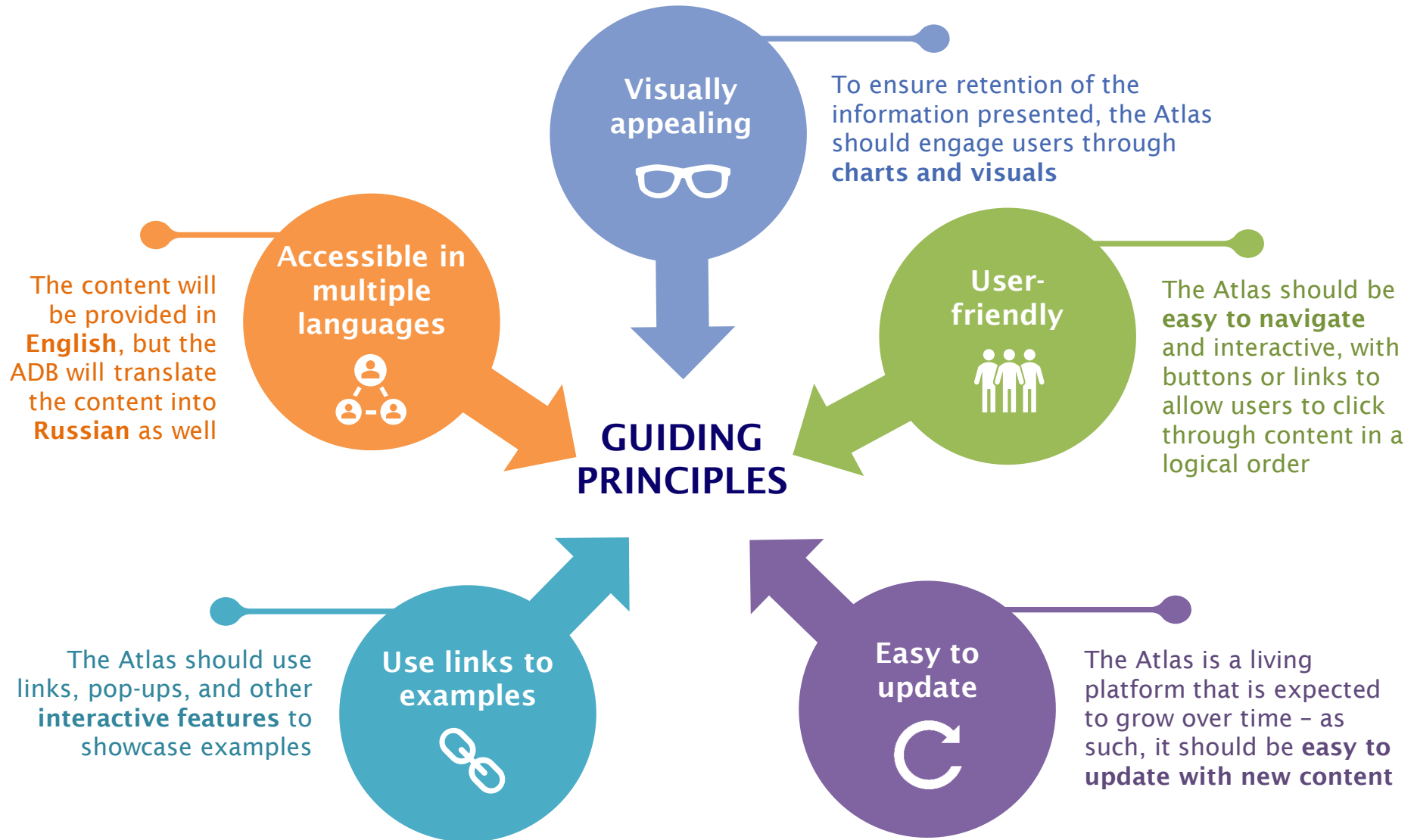
To stimulate online engagement through <u>interactive</u> features, logical navigation, and a <u>user-friendly</u> layout

The following presentation outlines a **robust concept for the CAREC Energy Reform Atlas**, including:
- ideas regarding the <u>structure and basic layout</u> of the platform;
- suggestions for <u>website features</u>; and
- <u>examples and inspiration</u> from the websites of organizations and academic institutions that are active in the energy space

The proposed visual concept is guided by five principles to ensure the Atlas is both engaging and informative

Visually appealing

To ensure retention of the information presented, the Atlas should engage users through **charts and visuals**

Accessible in multiple languages

The content will be provided in **English**, but the ADB will translate the content into **Russian** as well

User-friendly

The Atlas should be **easy to navigate** and interactive, with buttons or links to allow users to click through content in a logical order

GUIDING PRINCIPLES

Use links to examples

The Atlas should use links, pop-ups, and other **interactive features** to showcase examples

Easy to update

The Atlas is a living platform that is expected to grow over time – as such, it should be **easy to update with new content**

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The purpose of the following survey is to examine the best practices for energy sector web design

▶ **To guide the design of the CAREC Energy Reform Atlas, we surveyed the websites of notable entities in the energy space**

- Goal of the survey was to examine the features of website design that could be incorporated into the concept for the Atlas

▶ **Structure of the survey is as follows:**

- We present several screenshots of each website in the following slides, annotated with notable features and design choices

- Links to each website are provided for further browsing

- The final slide of the survey summarizes the observed best practices across the websites reviewed, focusing on visual tools and features

Websites included in the survey

US Energy Information Administration ("EIA")

The EIA "collects, analyzes, and disseminates independent and impartial energy information to promote sound policymaking, efficient markets, and public understanding of energy and its interaction with the economy and the environment."

Columbia Center on Global Energy Policy ("CGEP")

The CGEP at Columbia University "advances smart, actionable and evidence-based energy and climate solutions through research, education and dialogue."

International Renewable Energy Agency ("IRENA")

The IRENA "is an intergovernmental organization that supports countries in their transition to a sustainable energy future, and serves as … a repository of policy, technology, resource and financial knowledge on renewable energy."

International Energy Agency ("IEA")

The IEA "is at the heart of global dialogue on energy, providing authoritative analysis, data, policy recommendations, and real-world solutions to help countries provide secure and sustainable energy for all."

US Energy Information Administration
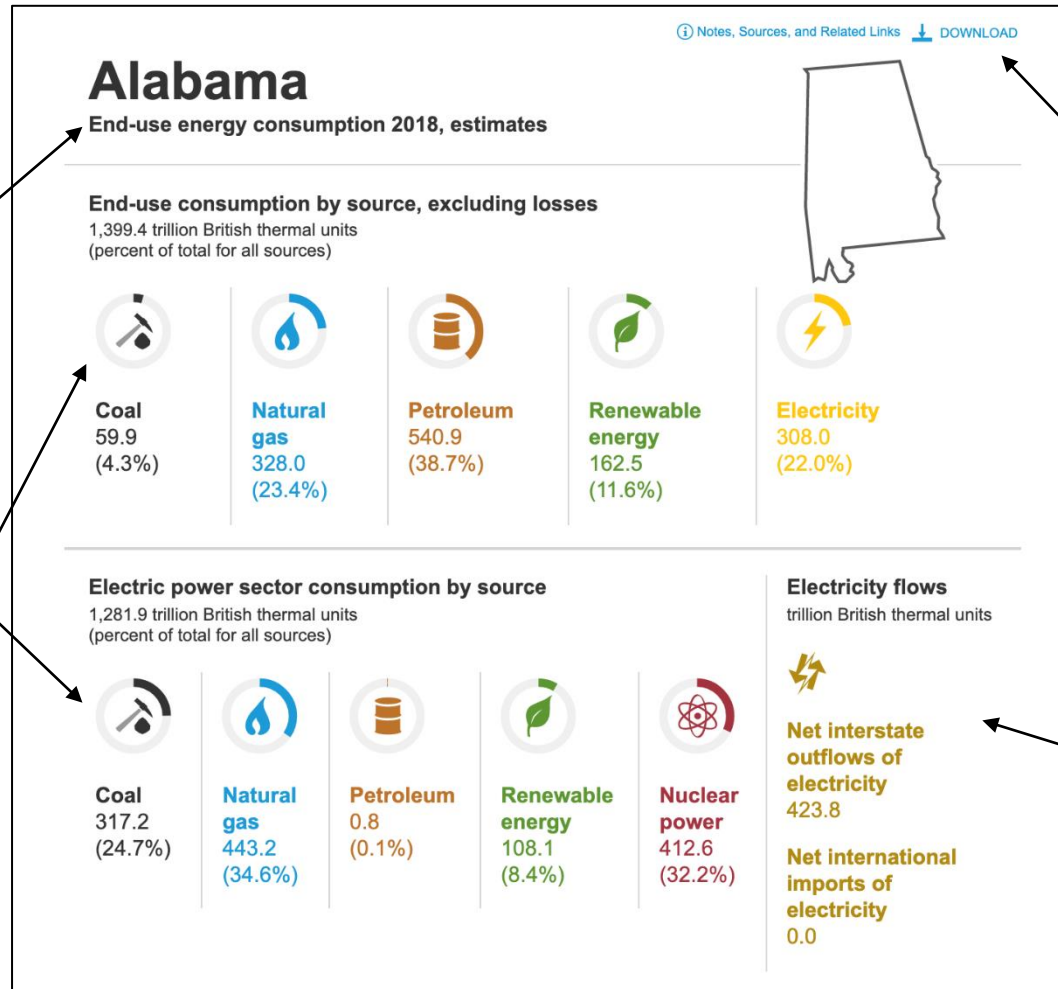
Easy-to-read, sans serif font, with consistent font size used throughout (only the state name is presented in a large font)

Visually-appealing, graphical depiction of key statistics, with simple yet effective use of icons

Option to download PDF version of information

Effective use of color: black font on white background, colors used to highlight data points

ⓘ Notes, Sources, and Related Links ⤓ DOWNLOAD

Alabama
End-use energy consumption 2018, estimates

End-use consumption by source, excluding losses
1,399.4 trillion British thermal units
(percent of total for all sources)

Coal
59.9
(4.3%)

Natural gas
328.0
(23.4%)

Petroleum
540.9
(38.7%)

Renewable energy
162.5
(11.6%)

Electricity
308.0
(22.0%)

Electric power sector consumption by source
1,281.9 trillion British thermal units
(percent of total for all sources)

Coal
317.2
(24.7%)

Natural gas
443.2
(34.6%)

Petroleum
0.8
(0.1%)

Renewable energy
108.1
(8.4%)

Nuclear power
412.6
(32.2%)

Electricity flows
trillion British thermal units

Net interstate outflows of electricity
423.8

Net international imports of electricity
0.0

Webpage available here: https://www.eia.gov/beta/states/states/al/overview

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US Energy Information Administration

Key facts presented in concise, high-level bullet points

Facts about Alabama

- Alabama is the second-largest hydroelectric power producer east of the Rocky Mountains, after New York. Twenty three hydroelectric dams provided almost 8% of the state's electricity net generation in 2019.

- In 2019, Mobile was the largest port of entry for U.S. coal imports by volume and the third-largest port for coal exports. About three-fourths of the coal mined in Alabama is exported.

- Alabama is the fifth-largest generator of electricity from nuclear power in the nation. The Browns Ferry nuclear power plant, with three reactors, is the second-largest U.S. nuclear electric

generating facility after Arizona's Palo Verde nuclear power plant.

- Alabama has about 4% of U.S. total wood pellet production capacity, including one wood pellet manufacturing plant that uses peanut hulls as feedstock.

- Alabama is the fifth-largest producer of electricity from biomass in the nation, and the state ranks third in timber acreage among the Lower 48 states.

- Last Updated: July 16, 2020

Read full profile analysis

Further detailed analysis available through an interactive link – keeps content digestible for users

Other resources for Alabama

- Alabama Department of Economic and Community Affairs (ADECA), Energy Division ⌐
- ADECA, Energy Division, Low-Income Assistance Programs ⌐
- ADECA, Energy Division, State Energy Program ⌐
- EIA Gulf of Mexico Fact Sheet
- Alabama Department of Environmental Management ⌐

More resources

Provides links to relevant entities for the jurisdiction – allows users to conveniently access further information

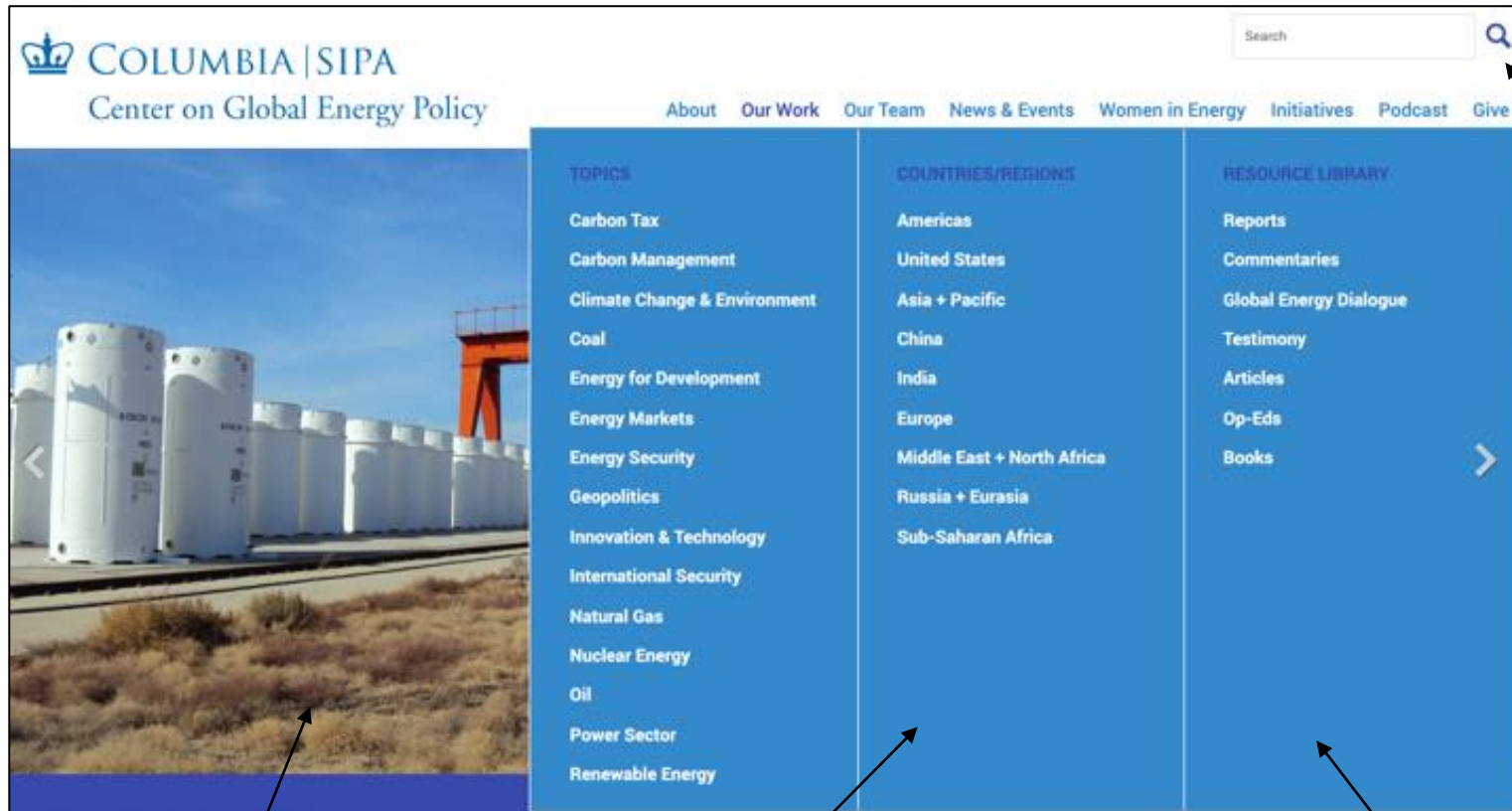Webpage available here: https://www.eia.gov/beta/states/states/al/overview

US Energy Information Administration
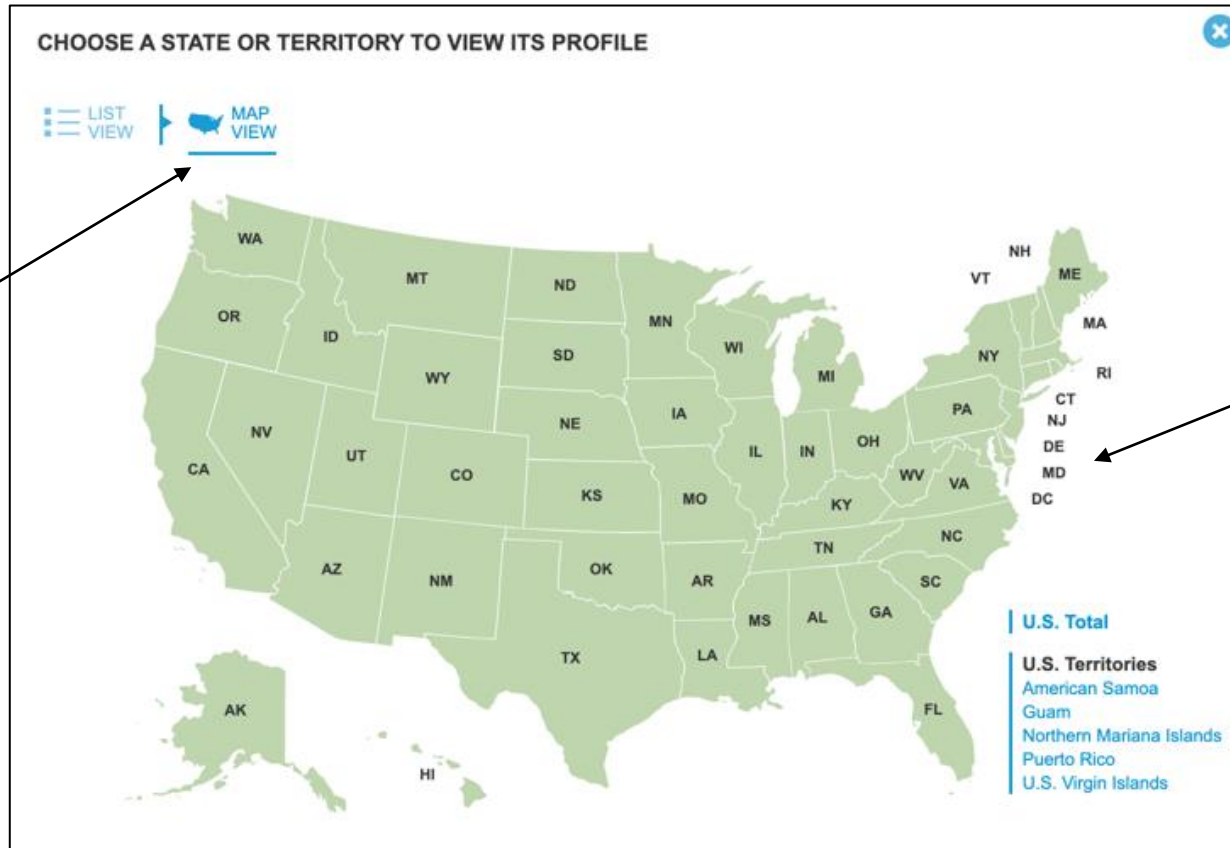
Geographical navigation: provides a map overview of all relevant jurisdictions

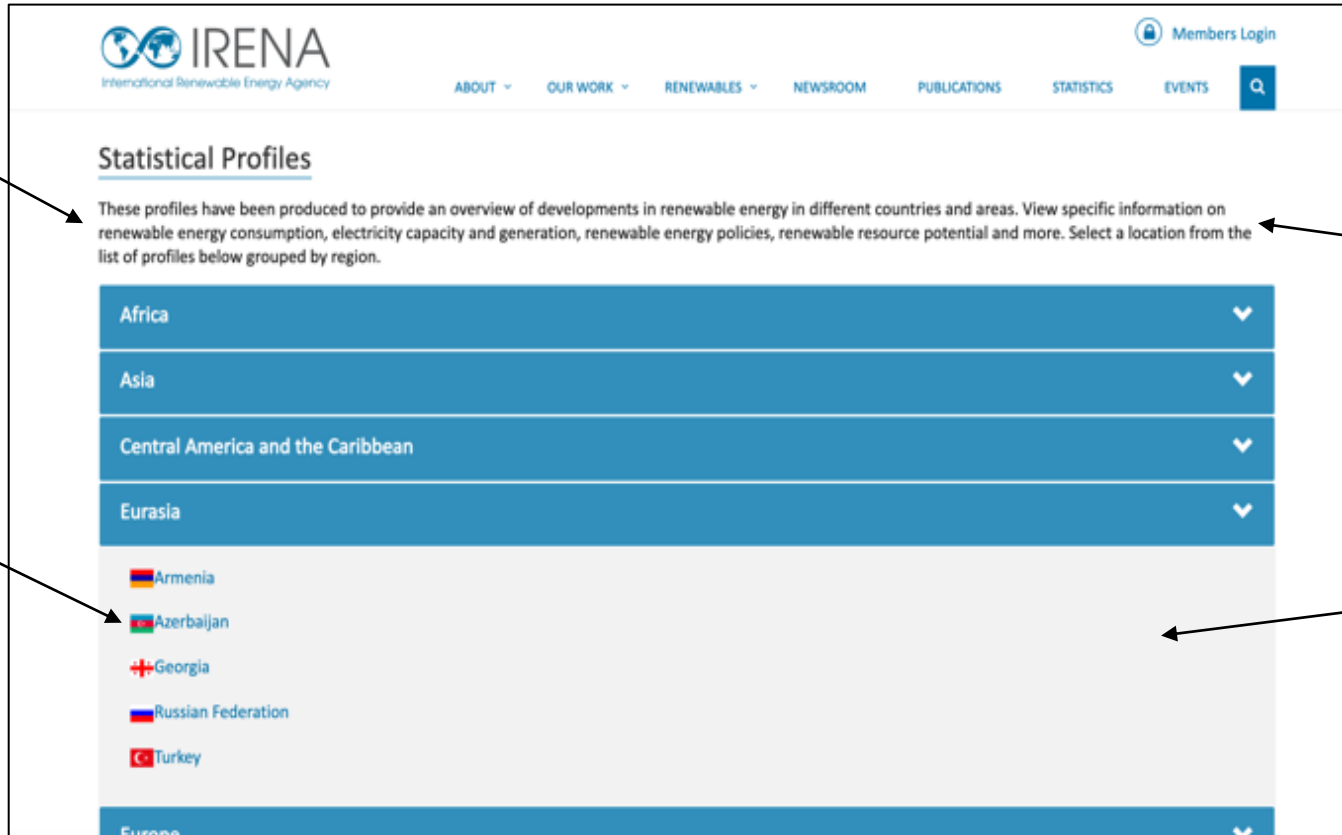Clicking on or selecting a specific state takes user to the relevant profile

Webpage available here: https://www.eia.gov/beta/states/states/al/overview

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Columbia Centre on Global Energy Policy

Search bar to allow users to search entire website based on keywords

Use of relevant images to create visual interest

Simple, sans serif fonts on contrasting background, color theme consistent throughout

Knowledge materials clearly organized by topic, region, and publication type

Webpage available here: https://www.energypolicy.columbia.edu/

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International Renewable Energy Agency

Simple, sans serif font on white background

Country profiles presented in list form and separated by region, addition of flags creates visual interest

Describes purpose of the profiles, the type of data included, as well as navigational instructions

Clicking on each country name opens a separate PDF statistical profile

Webpage available here: https://www.irena.org/Statistics/Statistical-Profiles

International Renewable Energy Agency

Simple, sans serif font on white background; minimal use of color to avoid visual clutter
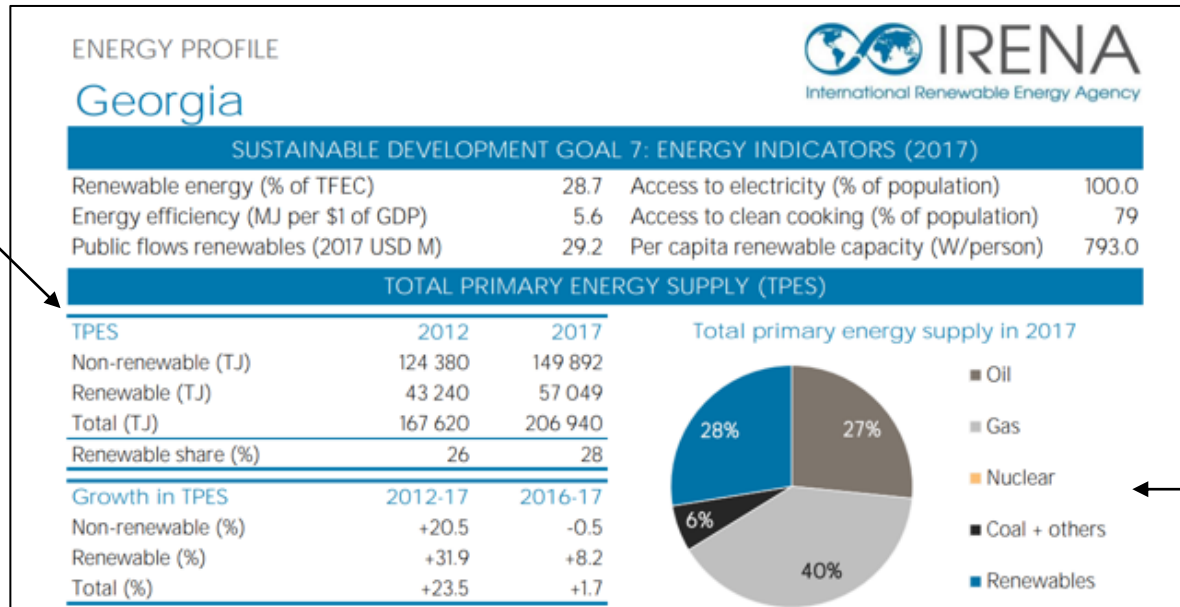
Graphs and tables used to present key statistics

List of key policies in chronological order

ENERGY PROFILE

Georgia

OO IRENA
International Renewable Energy Agency

SUSTAINABLE DEVELOPMENT GOAL 7: ENERGY INDICATORS (2017)

Renewable energy (% of TFEC)	28.7	Access to electricity (% of population)	100.0
Energy efficiency (MJ per $1 of GDP)	5.6	Access to clean cooking (% of population)	79
Public flows renewables (2017 USD M)	29.2	Per capita renewable capacity (W/person)	793.0

TOTAL PRIMARY ENERGY SUPPLY (TPES)

TPES	2012	2017
Non-renewable (TJ)	124 380	149 892
Renewable (TJ)	43 240	57 049
Total (TJ)	167 620	206 940
Renewable share (%)	26	28

Growth in TPES	2012-17	2016-17
Non-renewable (%)	+20.5	-0.5
Renewable (%)	+31.9	+8.2
Total (%)	+23.5	+1.7

Total primary energy supply in 2017

28% / 27% / 6% / 40%

■ Oil
■ Gas
■ Nuclear
■ Coal + others
■ Renewables

Latest policies, programmes and legislation

1	Directive #2010/31/EU on Energy Performance of Buildings (EPBD)	2019
2	EN 14511-2:2018 - test methods and standards for air conditioners, liquid chilling packages and heat pumps	2018
3	EN 14511-3:2018 - test methods for air conditioners, chillers and heat pumps	2018
4	EN 14511-4:2018 - standard on Air Conditioners	2018
5	MEPS for cooling equipment (EN 14511-1:2018)	2018

Webpage available here: https://www.irena.org/IRENADocuments/Statistical_Profiles/Eurasia/Georgia_Eurasia_RE_SP.pdf

International Renewable Energy Agency

Newly published knowledge materials
highlighted in a separate section

Key knowledge
materials featured
prominently

Content organized
by topic with
clickable links

Webpage available here: https://www.irena.org/publications

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International Energy Agency

Presents satellite images of region (rather than stylized map)
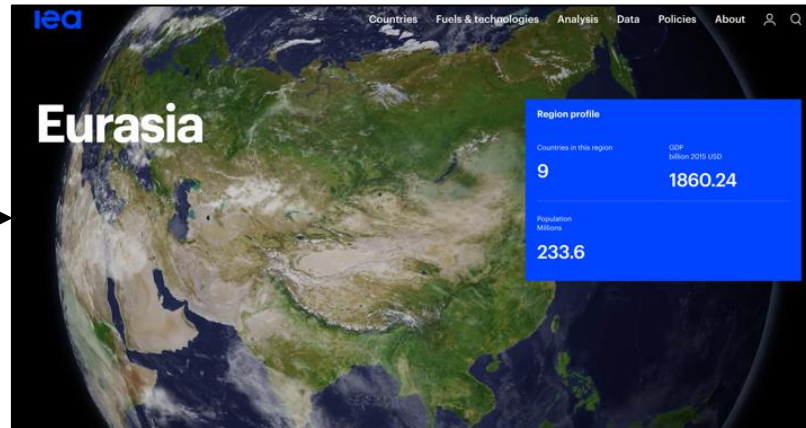
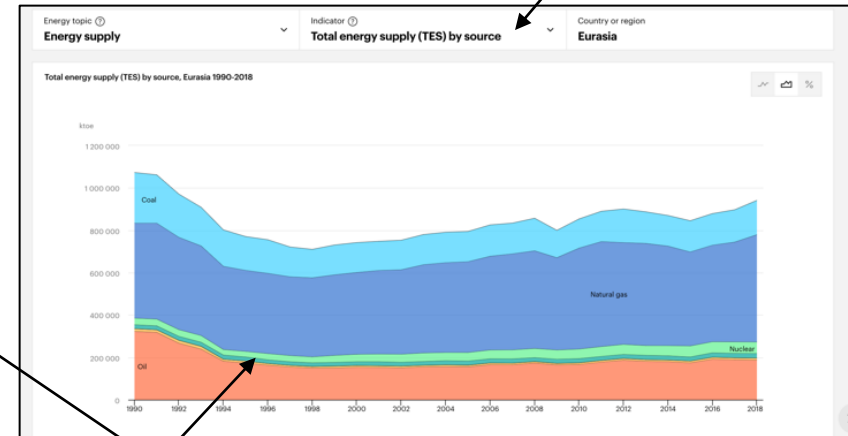Summary statistics for region pulled out and presented upfront

Users can choose to view different data via drop down menu

Sans serif font on white background; neatly aligned columns and rows to enhance clarity

Key statistics presented in table and graphical form; minimal yet effective use of color

Webpage available here: https://www.iea.org/regions/eurasia

International Energy Agency

News and policies highlighted

Clicking on a specific policy takes user to more detailed information

Webpage available here: https://www.iea.org/regions/eurasia

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Websites surveyed had common characteristics in terms of navigation, visuals, layout, and other features

Elements	Best practices	Examples
Navigation	• Allow users to access information on relevant jurisdictions through map view • Organize knowledge materials by country/region, topic, publication type	
Visuals	• Use easy-to-read, sans serif fonts on white or color-contrasting backgrounds • Provide data and key statistics through both written (table, narrative) and graphical (graph, infographic) formats	
Layout	• For jurisdictional profiles, present headline statistics first followed by key facts/analysis • Separate section for knowledge materials, with key publications/recent materials highlighted • Integrated layout, with links in one section taking users to more detailed information on another part of the website	
Other features	• Offer PDF versions of fact sheets and knowledge materials • Provide links to policies, government websites, and other relevant resources	
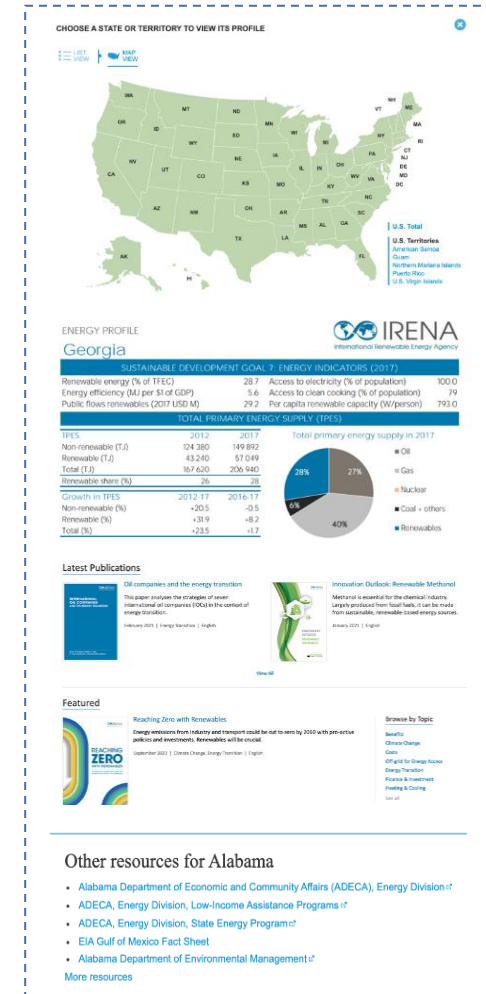
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Users will be able to navigate most of the content via one of two means, either by country or by topic

Geographical navigation

Topical navigation

► **Allows users to browse content by country or region**

► **Optimized viewing for report content related to jurisdictional scans and case study examples**

► **Content can be built out and curated by the ADB over time for each country; for this engagement, we will provide basic information for most countries, and detailed information for the six case studies in the reports**
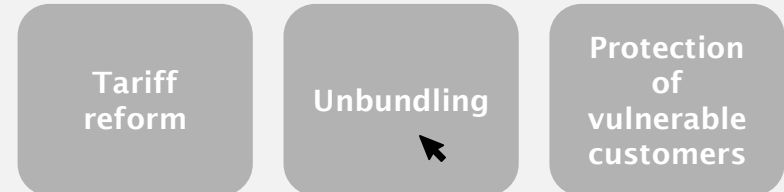
► **Allows users to browse content by topic or area of interest (initially this will include tariff reform, unbundling, and vulnerable customers)**

► **Optimized viewing for report content related to theory and proposed implementation approaches**

► **Can include high-level summaries, as well as detailed information in separate pop-ups, to make content digestible**

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Case studies will be selected to exemplify each of the major approaches to tariff reform and unbundling

Tariff reform categories

Cost of service ("COS") framework

Traditional form of utility regulation, where changes in rates are linked to an evolution in underlying costs

Standard performance-based ratemaking ("PBR")

A regulatory approach that aims to provide incentives for regulated utilities to improve efficiency

Next generation PBR

Assesses regulated utilities' performance in broad categories against a set of expected outcomes

Unbundling categories

Corporatization

Financial unbundling at the accounting level, while ownership and governance of the entity remains unchanged

Partial unbundling

Involves corporate unbundling of some business functions (e.g., competition introduced among generation, but not wires)

Full unbundling

Privatization where separate companies are created at each segment of the electricity value chain

Note: We will attempt to sort all countries into these high-level categories, although some will be at an even earlier stage of development (e.g., countries with non-cost recovery tariffs, or those where the unbundling process has not yet started)

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Content will be provided most extensively for the six case studies, which will be selected in collaboration with the ADB

United Kingdom ("UK")
- A heavily cited example
- Showcases next generation performance-based ratemaking

Ukraine
- A recent example of energy sector reform that is particularly relevant to the CAREC region

Ontario, Canada
- Began unbundling from a similar starting point to many CAREC countries – a vertically-integrated, provincially-owned utility

Malaysia
- An example of a market that achieved financial but not corporate unbundling

Colombia
- Provides insights from the Latin American experience

Australia
- Most Australian states have reached full unbundling and are often studied/cited

Case study selection will ultimately be driven by the following factors:
- Appropriateness for the CAREC region
- Examples from a range of successful to less successful experiences
- Examples from a range of income levels
- Citation space (e.g., UK and Australia are often cited in literature)

Preliminary case studies to be included in the Tariff Reform Toolkit and Manual on Unbundling

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Geographical navigation will allow users to get a sense of what's happening in each country regarding energy reform

1. **Each country** will have the following information:

   ▶ Basic economic indicators (e.g., GDP per capita)

   ▶ Links to the websites of relevant entities in the energy space (e.g., the regulator, ministerial agency, as well as entities involved in the generation, transmission, and distribution sectors)

2. **Each CAREC member** country will have the following information (in addition to (1) above):

   ▶ A market snapshot (see samples to the right) with key electricity sector statistics and an overview of the sector (e.g., key players, key announced plans)

3. **Each case study** country will have the following information (in addition to (1) and (2) above):

   ▶ A write up on the evolution of its efforts relating to tariff reform and unbundling

   ▶ Commentary on lessons learned and best practices observed from its experience

Sample market snapshots

	Afghanistan		
Economic data	Population (2019) 38,041,754	Per capita income (2019) Absolute: $507 PPP: $2,156	Economic growth 2014-2019 CAGR: 4.5% 2021: 4%
Electricity statistics	Net consumption: 6 TWh (2018) Peak demand: 750 MW (2018) Load per capita: 100-150 kWh (2015)	Load growth Historical: 13% CAGR (2009-2018) Projected base case: 5.7%-8.7% CAGR (2013-2032)	Load composition by sector Household: 93%; Commercial: 7%; Government: <1%
Tariff (US cents/kWh)	Residential: 3.2 - 13 Commercial: 16 Industrial: 8.7 - 16		
Capacity	Total (2018) 600 MW (plus significant imports, around 80% of total supply)	By fuel source Fossil fuels: 50% Hydro: 50% Solar/wind: minor	
Key players *State-owned ** Partially state-owned	Regulator Ministry of Energy and Water	Generation Da Afghanistan Breshna Sherkat*	Transmission and distribution T: Da Afghanistan Breshna Sherkat* D: Da Afghanistan Breshna Sherkat*
Key announced plans	- 2013 Power Sector Master Plan calls for an increase in the electrification rate from 30% to 81% by 2030 - Major transmission projects: TUTAP, TAP, CASA-1000 - 2017 Renewable Energy Roadmap targets deploying 4.5-5 GW of renewable energy capacity by 2032, and envisions a transition from donor grant-funded renewable projects to a fully-private sector led industry by 2032 - 2015 Electricity Law called for the establishment of an Energy Regulatory Authority, yet to be established		
Belt and Road Initiative	No Belt and Road initiatives recorded		

	Uzbekistan		
Economic data	Population (2019) 35,580,650	Per capita income (2019) Absolute: $1,725 PPP: $7,308	Economic growth 2014-2019 CAGR: 23.6% 2019-2025 CAGR: 13.5%
Electricity statistics	Net consumption: 49.20 TWh (2018) Load per capita: 1.47 MWh (2018)	Historical load growth: 2.9% CAGR (2014-2019) Projected peak demand growth: 4% (2016-2022)	Load composition by sector Industry: 40%; Residential: 23%; Agriculture: 20%; Utility: 13%; Transport: 3%; Construction: 1%
Tariff (US cents/kWh)	Residential: 3 Other: 4		
Capacity	Total 12,803 MW	By fuel source Fossil fuels: 14% Hydro: 86%	
Key players *State-owned ** Partially state-owned	Regulator Ministry of Energy	Generation State-owned thermal power plants	Transmission and distribution T: National Electric Networks of Uzbekistan* D: Regional Electric Networks*
Key announced plans	- Plans for privatization (Law on the Use of Renewable Energy Sources and the Law on Public-Private Partnerships as well as the Regulations for Connecting Businesses that Produce Electricity, Including from Renewable Energy Sources, to the Unified Electric Power System) - Uzbekistan is a large producer of natural gas (60 bn cubic meters annually)		
Belt and Road Initiative	BRI's China, Central Asia, West Asia Economic Corridor: linking to Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan, Turkmenistan, Iran, and Turkey.		

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Topical navigation will allow users to focus on content related to their area of interest

1. **Content will initially cover the following topics:**

   ► Tariff reform (see indicative table of contents for the report to the right)

   ► Unbundling

   ► Consumer protection

2. **Additional topics can be added to the Atlas through possible future ADB initiatives**

3. **Navigation can be organized according to the headings included in each report**

   ► e.g., for the Tariff Reform section of the website, there can be separate pages for "tariff design basics" or "key takeaways"

4. **Proposed implementation approaches can be presented visually through a "digital roadmap"**

   ► See the following two slides for examples

   ► The main page of the roadmap would include a winding road with signposts differentiating each "step" in the approach, along with a high-level summary; users could then click on each "step" for more information

Indicative table of contents for the Tariff Reform Toolkit

> High-level summary of topics covered and key findings

> Overview of theory underlying tariff design and regulatory approaches

> Case study analysis of experiences in other countries

> Envisioned approach to tariff reform and key considerations

> Reiteration of report findings (lessons learned, best practices, potential pitfalls to avoid, etc.)

Digital roadmap concept applied to the 12-step tariff reform implementation approach

Implementing tariff reform

Step 1:
Determine underlying cost structure

Step 2:
Calculate appropriate cost of capital

Step 4:
Determine whether customer classes reflect cost causation; if necessary, redefine customer classes and reallocate cost recovery

Step 5:
Examine billing determinants and block design for economic efficiency; evolve if necessary

Step 3:
Assess whether existing tariff is cost reflective; if not, determine approach to reach cost recovery

Step 6:
Determine role of productivity incentives and performance standards

Step 7:
Develop a lifeline tariff

Will identify potential "potholes" or pitfalls along the way that policymakers should be aware of and avoid. These will be informed by the case study analysis.

Step 8:
Assess collection issues

Step 9:
Explore the necessity of line loss provisions

Step 10:
Describe how tariffs are revised and investments approved

Step 12:
Develop formulas for rate adjustments within regulatory periods

Step 11:
Determine the appropriate length of regulatory periods

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Digital roadmap concept applied to the 10-step unbundling implementation approach

Steps to unbundling

Step 1:
Identify appropriate points in the value chain to establish individual entity activities

Step 2:
Determine the appropriate number of entities at each value chain point

Step 3:
Delineate assets, accounts, and staffing

Step 4:
Establish starting contractual relationships

Step 5:
Assess the role of the regulator, markets, and competition

Will identify potential "potholes" or pitfalls along the way that policymakers should be aware of and avoid. These will be informed by the case study analysis.

Step 6:
Explore the role of private sector and foreign investors

Step 7:
Optimize the capital structure for each entity

Step 8:
Allocate legacy liabilities

Step 9:
Examine whether protections for vulnerable customers are necessary

Step 10:
Develop long-term strategic plans for each entity

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| **3** | **Additional suggestions for website features** |

Additional website features should provide users with ways to access further related information

PDF download option

Users should be able to download PDFs of the complete reports (e.g., Tariff Reform Toolkit, Manual on Unbundling) for later use

Suggestion box

Users should be able to suggest new topics to be added to the Atlas, through some type of submission form

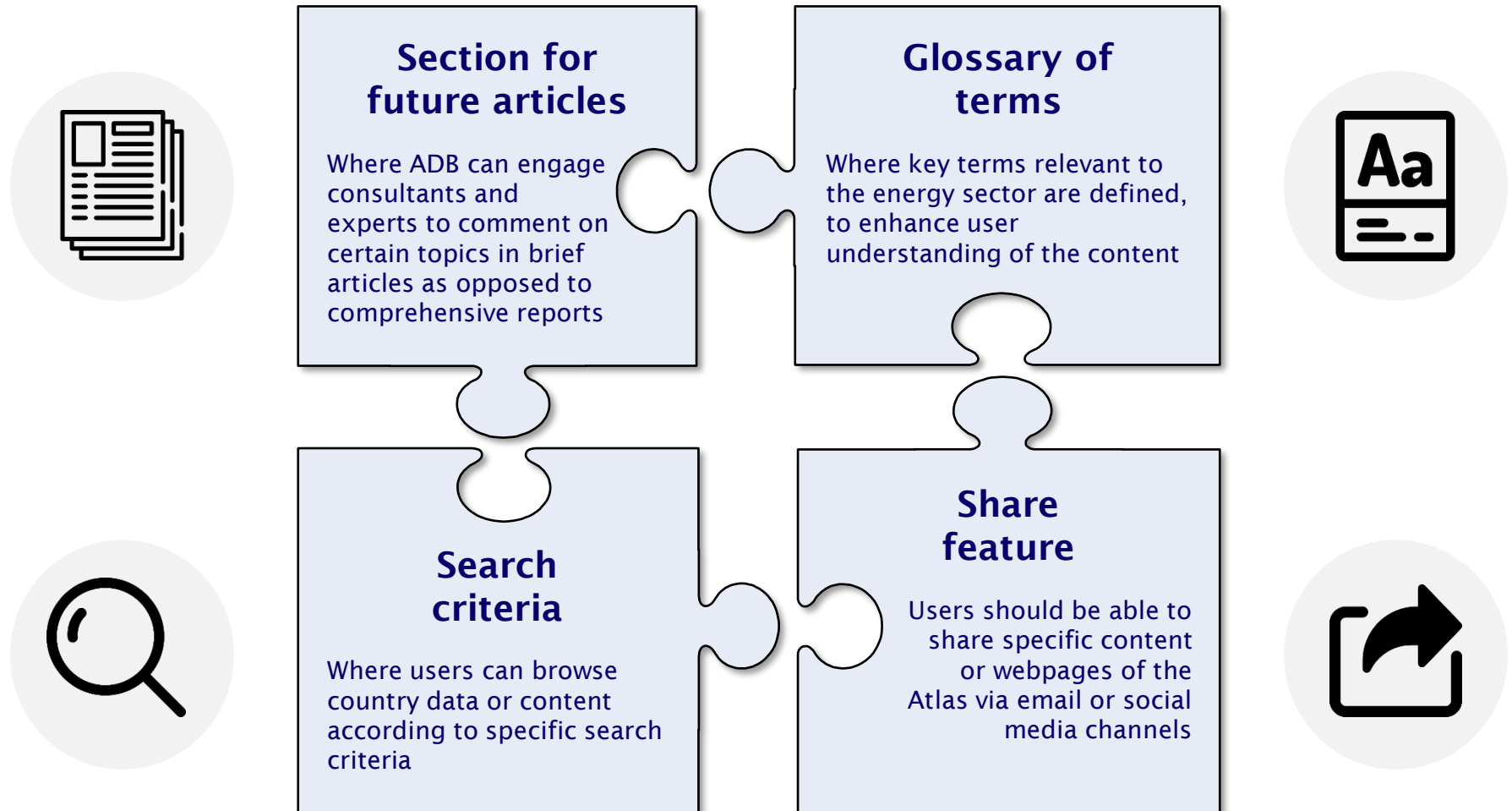## Landing page for EIF content

Users should be able to access content from previous and future EIFs (e.g., conference agendas, programs, slides)

Document library

Users should be able to access resources used to inform the reports – this can be formatted on a single webpage as a bibliography with links

Additional website features should provide users with ways to access further related information

Section for future articles

Where ADB can engage consultants and experts to comment on certain topics in brief articles as opposed to comprehensive reports

Glossary of terms

Where key terms relevant to the energy sector are defined, to enhance user understanding of the content

Search criteria

Where users can browse country data or content according to specific search criteria

Share feature

Users should be able to share specific content or webpages of the Atlas via email or social media channels

Additional website features should provide users with ways to access further related information

About page

Should include information about the CAREC energy reform initiative; will place the Atlas content in context for all users

Infographics

Market snapshots for CAREC countries and case studies should be downloadable; other infographics can be created later to summarize additional topics of interest

Sitemap webpage

Page with clickable headings laying out the overall structure of the Atlas – enhances navigation clarity