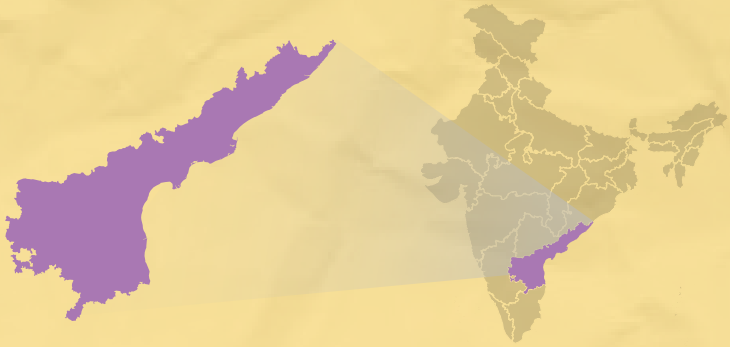

A Factsheet

Andhra Pradesh's Public Policy Priorities for Transitioning towards Green Economic Recovery

2022

CBGA

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Andhra Pradesh's Public Policy Priorities for Transitioning towards Green Economic Recovery

About Factsheet: The factsheet highlights current efforts by the State of Andhra Pradesh towards financing climate change mitigation actions in various sectors such as; power, agriculture, transport and urban development. It identifies policy measures for long-term transformation towards green economic recovery.

This factsheet is prepared under the Project:

Building Knowledge and Capacity for Green Economic Recovery of the States in India

A Factsheet

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The Context

The environment today has undergone several changes. Any activity that affects the environment of a region would also create an impact on the physiological, social, and economic aspects of its inhabitants.

This factsheet analyses the different drivers of Andhra Pradesh's economy, measures taken by the State to reduce its GHG emissions and policies that align with a Green Economic Recovery. It also looks at the fiscal performance of the State during pre-COVID-19 times and the present, and various policy interventions with an outlook for a carbon-neutral economy. It has been observed that the total expenditure in the energy sector has reduced from 6.7% in 2019-20 to 3% in 2020-21. The budget heads from various sectors, mainly energy, have been studied to assess if there has been a shift in financing priorities and how it has affected outlays for schemes and programmes of climate mitigation relevance. The factsheet has analysed cross-sectional supplementary information pertaining to direct or indirect support measures for climate change mitigation interventions. Budget data covering inclusive and cohesive measures for climate financing is collated from 2017-18 onwards. The factsheet identifies gaps and opportunities for a Green Economic Recovery.

The report assesses State budget data, from the energy sector, analyses development processes in the State and identifies different growth drivers that can help achieve a Green Economic Recovery. It examines the impact of the COVID-19 pandemic on public financing of climate mitigation measures in various sectors. There are several starting points for a Green Economic Recovery at the sub–national level based on varying social, economic and political contexts. This factsheet presents a comprehensive review of the performance, financing framework and mainstreaming of low-carbon strategies in the major sectors of the State. It presents an in-depth analysis of the State's energy sector financing over the last five years. It makes an attempt to benchmark "favourability" of expenditure towards climate change mitigation. Gaps in aligning the State's climate financing with a Green Economic Recovery are also highlighted to make transformation interventions and policy recommendations.

Section I

Goals and Objectives

The goals of this factsheet are to present the ongoing efforts of the Andhra Pradesh government for a clean energy transition and to identify issues in its path to a Green Economic Recovery. The objectives are:

1. To understand the impact of the COVID-19 pandemic on Andhra Pradesh's overall spending and its efforts on climate change mitigation through a review of baseline indicators and to track financial resources available for a clean energy transition.

2. To identify starting points for a long-term transformation towards a clean energy-based economy and to assess the impact of the COVID-19 pandemic on the State's overall spending priorities on various sectors, including energy.

3. To present a policy and institutional landscape assessment of climate change mitigation policies in the energy, transport and urban development sectors in Andhra Pradesh and also assess the State's participation in various national climate change mitigation programmes.

Section II

Scope and Methodology

2.1 Methodology to track the financial resources available with Andhra Pradesh for expenditure on clean energy initiatives (Objective 1)

The resource envelope of Andhra Pradesh's power sector was assessed and plausible estimates on finances were made across the following aspects and channels:

A. Budgetary allocations from the Energy Department, Government of Andhra Pradesh

B. Share of international loans in budgetary allocations from the Energy Department

C. Internal and Extra Budgetary Resource (IEBR) reimbursement to Andhra Pradesh through Central PSUs in the power and renewable energy sector

D. Finance Commission Grants (if any) with respect to clean energy

Key sources of information reviewed were as follows:

- Budget documents of various State departments
- International loans routed through departmental budgets
- Recommendations of the Fourteenth and Fifteenth Finance Commissions
- Union Budget documents pertaining to renewable energy and transfers to the Andhra Pradesh government
- State Budget documents State-level policies and frameworks through New and Renewable Energy Development Corporation of Andhra Pradesh (NREDCAP)
- Energy distribution through Andhra Pradesh State Electricity Regulation Commission (APSERC)

A trend analysis of Andhra Pradesh's Total Budget Expenditure (TBE) for various departments has been carried out covering pre-COVID years and the present. The State's overall physical progress on renewable energy targets and other outcome indicators through implementation of various policies and regulations is also collated. Key sources of information:

- Andhra Pradesh State Economic Survey
- Greenhouse Gas inventory for various sectors of Andhra Pradesh's economy available online at GHG Platform-India
- State Budget Documents and Detailed Demand for Grants (DDGs) pertaining to the Energy Department from financial year 2017-18 to 2021-22
- Ministry of New and Renewable Energy (MNRE) and Central Electricity Authority (CEA) data on the progress on State-wise targets pertaining to renewable energy
- Status of Andhra Pradesh's Renewable Energy Purchase Obligation
- Annual Transmission and Distribution Losses

Limitations: It was observed that highly favourable budget lines for Andhra Pradesh were not available from 2018-19 onwards. It might be possible that the Renewable Energy Department was shifted to the New and Renewable Energy Development Corporation of Andhra Pradesh (NREDCAP) which led to a nil allocation against renewable energy schemes in the State's energy department budget. There have been huge capital investments in the solar and wind sectors, mostly by the private developers.

Schemes such as YSR Nine-hour Free Power Supply Programme were powered by solar after 2020-21 due to the State government's decision to provide free power supply through the commissioning of solar plants. Prior to that the scheme envisaged subsidising power using conventional sources of energy. This also led to a difficulty in classifying the scheme. In such a scenario, we used secondary supplementary information available, such as A.P. government orders. We also analysed sectors other than energy to understand the State Budget's climate change mitigation related expenditure.

2.2 Methodology to understand the responsiveness of State Budgetary Expenditure towards a clean energy transition (Objective 2)

By classifying expenditure, the conduciveness of the State's Energy Expenditure Budget towards the promotion of renewable energy was assessed. Expenditure budget lines with five tiers of budget information were analysed for their coherence with national targets for clean energy and financial support provided for a clean energy transition. The subsequent section provides the methodological steps followed, definitions, and rationale for assignment of categories to budgetary expenditure. Several steps are involved in assessing climate responsiveness of budgets. The three major steps are:

1) Identification of the scope of expenditure: Identifying the department mandated with power sector development. In Andhra Pradesh, it is the Energy Department. Expenditure items that are to be included and excluded are identified at the scoping stage. Only the expenditure budget is kept within the scope of the analysis.

2) Identification of Budget lines that are neutral or "with climate responsiveness": Categorising expenditure items as "neutral" or "with climate responsiveness" Expenditure items 'with climate responsiveness' are to be analysed in depth, most often by analysing supplementary information in addition to budgetary or financial data. There are five tiers of information in Budget accounts: Major heads, Sub-major heads, Minor heads, Detailed heads and Object heads. Identification of the budget lines into – "with climate responsiveness" or "neutral" category, is carried out by linking and unifying the information in these five tiers of information. The criteria for identifying the budget lines as "neutral" or "with climate responsiveness" are as follows:

1. **Neutral:** This expenditure does not have a significant responsiveness towards emissions or in capturing GHGs. It therefore does not actively contribute to climate change, nor does it help reduce GHG emissions. Examples: social benefits to employees, salaries, administrative travel, recoveries and food allowances.

2. **With climate responsiveness:** This expenditure is compatible with a national ambition for climate change mitigation, particularly renewable energy. It leads to a significant reduction in emissions compared to existing alternatives. For example, increasing renewable energy capacity, Transmission and Distribution network, electrification using off-grid technologies.

3) Analysis on priorities of expenditure "with climate responsiveness": The aim is to identify the climate responsiveness of all expenditure in the budget of State Power Departments. It consists of

an analysis of the budget, based on rationale-based categorisation of actions. The actions are then rated as Highly favourable, Quite favourable, Unfavourable or Undefined for the climate. The results provide a better understanding of the coherence of expenditure in achieving a clean energy transition, and thereby help in making progressive budget decisions for a Greening Economic Recovery. Expenditure items are classified into three categories according to their responsiveness on climate needs:

i. **Highly Favourable:** This expenditure is in line with the national ambition for climate change mitigation. Expenditure on this activity leads to a significant reduction in emissions compared to existing alternatives. For example: Installation of Renewable Energy Capacity

ii. **Quite Favourable:** This expenditure reduces emissions in the short term, but the reduction is insufficient to put the area on the path to low-carbon development. This category notably includes equipment and infrastructure that present a risk of long-term carbon lock-in. For example: Transmission and Distribution networks

iii. **Unfavourable:** This expenditure is not in line with India's commitment to mitigate climate change because it makes a significant contribution to GHG emissions. For example: Subsidies for diesel-based pumps or fossil fuel-based power generation

iv. **Quite Favourable:** This expenditure reduces emissions in the short term, but the reduction is insufficient to put the area on the path to low carbon development. This category notably includes equipment and infrastructure that present a risk of carbon lock-in the long term. For example, Transmission and Distribution networks

v. **Unfavourable:** This expenditure is not coherent with the Indian commitment for climate change because it makes a significant contribution to greenhouse gas emissions. For example, subsidies for diesel-based pumps or fossil fuel-based power generation

vi. **Undefined:** This expenditure does not fit into any of the above three categories, as it requires extra-budgetary supplementary information and needs to be discussed with the State Government.

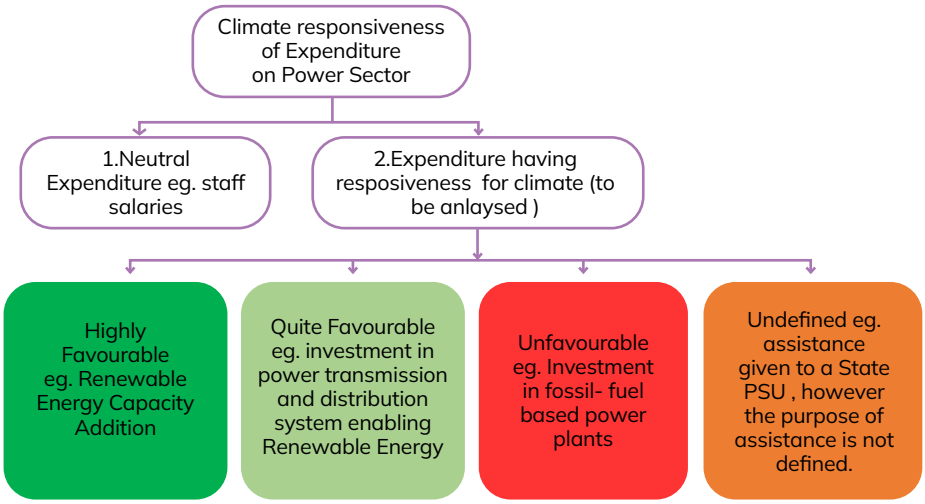
Users can see the application of the above methodology in the appended spreadsheet in Annexure 1.

Figure 1: Climate Responsiveness Categorization

Step 1: Identification of key department(s) for power sector

Step 2: Identification of Budget lines that is, neutral or "with climate mitigation responsiveness"

Step 3: Rating the responsiveness of budget expenditure for Climate Change Mitigation (clean energy transition)



2.3 Methodology to understand the impact of the COVID-19 pandemic on the State's overall expenditure, and the starting points for a long-term transformation towards a clean energy-based economy (objective 3)

Andhra Pradesh's overall progress on renewable energy targets and other important outcome indicators were collated. Interventions from different agencies were assessed on their feasibility to achieve low-carbon development. The main sectors covered were energy, transport, and urban development. In the transport sector, policies for the promotion of public transport and electric mobility were assessed. In the urban development sector, central sector schemes that could possibly aid in climate mitigation were considered. In the energy sector, the main points from various renewable energy policies were highlighted. Solar is the main component of Andhra Pradesh's renewable energy and hence, the State's Solar Export Policy was extensively analysed. Mission guidelines were studied for an understanding of up-skilling efforts (if any) for jobs in renewable energy and other climate mitigation sectors like Electric Mobility, etc. Key sources of information were:

- Andhra Pradesh State Renewable Energy Policy
- Andhra Pradesh State Solar Policy
- Andhra Pradesh State Solar Export Policy
- Andhra Pradesh State Wind Policy
- Andhra Pradesh Electric Vehicle Policy
- Programmes and schemes with co-benefits for climate change mitigation appearing in news media where the segregated budget data is not available.
- Union government guidelines for climate concern mainstreaming in smart cities
- Central government guidelines under specific programmes to promote electric vehicles such as the Faster Adoption and Manufacturing of Electric and Hybrid Vehicles (FAME)-II scheme
- Central scheme-specific portal providing information on State-wise performances. This is available for FAME-II, KUSUM, and energy efficiency-related schemes.

Limitations: Several Central schemes are not reflected in the budget lines for the years after the COVID-19 pandemic outbreak. Even though news and media sources highlight heavy spending in the State's renewable energy goals, especially in the solar sector, the budgetary allocation for them is not available yet. The newly formed NREDCAP that oversees the climate mitigation actions of the State also does not have information on policy expenditure or detailed sector-wise segregation of activities on its public portal. There is a lack of disaggregated budget data and data on provisions (in terms of programmes and schemes' budget allocations) for clean energy, clean fuel utilisation, energy efficiency-related initiatives in other sectors such as transport, urban development, and agriculture. Hence, we attempted to analyse the priorities of the existing policies, strategies, programmes and schemes through secondary literature surveys.

Section III

Results and findings

The following section presents the findings and results with the application of the above-described methodologies against the four objectives of this factsheet

Section I — Understanding the impact of the COVID-19 pandemic on the State's overall spending and baseline indicators for long-term transformation towards a clean energy- based economy (Objective 1)

Section II — Understanding the responsiveness or favourability of State Budgetary Expenditure towards a clean energy transition (Objective 2)

Section III — Policy and institutional landscape of climate mitigation policies in the energy, transport and urban development sectors and the assessment of State participation in key Union government schemes and programmes of climate relevance (Objective 3)

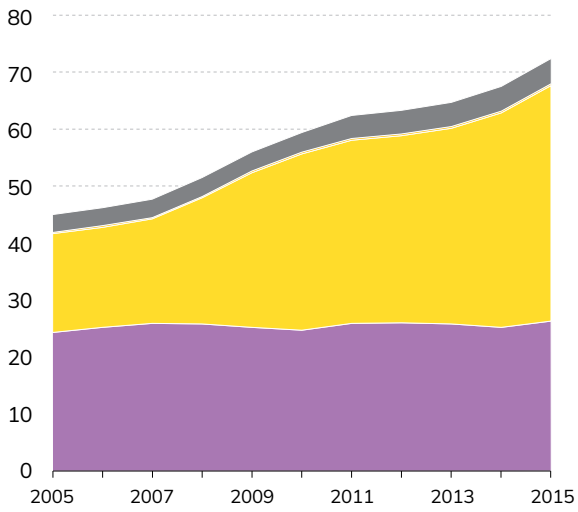
Section I: Understanding impact of the COVID-19 pandemic on the State's overall spending and efforts for climate change mitigation through review of baseline indicators and tracking financial resources available to fund clean energy transition (Objective 1)

3.1.1: Contribution of various sectors of economy towards GHG emissions in Andhra Pradesh

It can be seen that the energy sector has been the highest contributor to GHG emissions in Andhra Pradesh. From 2005 to 2015, there has been a 23% increase (17.4 to 41.4 MT) in GHG emissions in the energy sector. If this trend continues, it is predicted that the GHG emissions from the energy

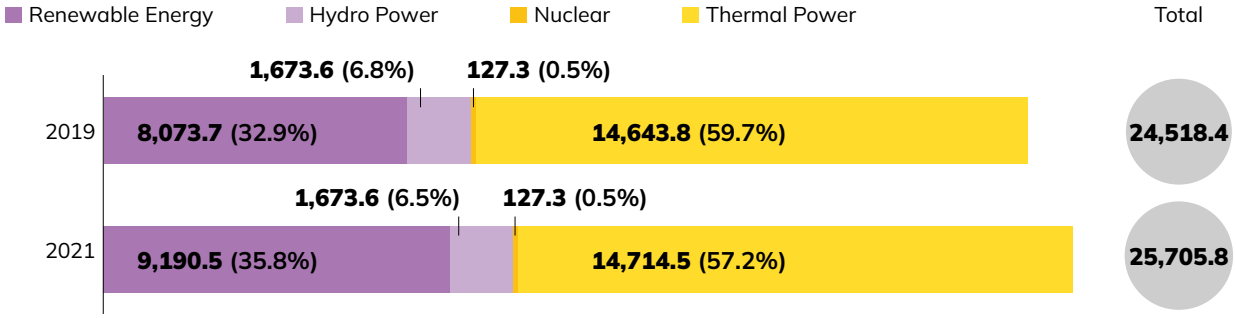
Figure 2: Sector-Wise GHG emissions

Emission estimates (Mt CO_2e)	Agriculture, Forestry & Other Land Use	Energy	Industrial Product and Process Use	Waste	Grand Total
2005	24.3	17.4	0.2	3.1	44.9
2006	25.2	17.6	0.3	3.1	46.2
2007	25.9	18.4	0.2	3.2	47.7
2008	25.8	22.2	0.2	3.3	51.6
2009	25.2	27.2	0.3	3.3	56.0
2010	24.7	31.0	0.3	3.4	59.4
2011	25.9	32.2	0.3	4.0	62.4
2012	26.0	32.9	0.3	4.1	63.3
2013	25.8	34.4	0.3	4.2	64.8
2014	25.2	37.7	0.3	4.3	67.5
2015	26.3	41.4	0.3	4.4	72.5



Source: GHG Platform India

Figure 3: Installed Capacity of power from different sources (MW)



Source: CEA data 2019, 2021

Figure 4: Major sources of emissions in Andhra Pradesh

Emission estimates (Mt CO_2e)

Up to 1.00
1.01 to 3.00
3.01 to 5.00
Above 5.00

	Agriculture	Commercial	Fisheries	Fuel Production	Public Electricity Generation	Residential	Transport	Energy
2010	0.30	0.08	0.15	2.40	40.10	3.76	5.27	52.06
2011	0.30	0.09	0.15	2.42	44.85	3.71	5.50	57.03
2012	0.31	0.09	0.16	2.43	48.34	3.69	5.74	60.76
2013	0.35	0.10	0.17	2.43	51.24	3.76	6.44	64.49
2014	0.35	0.09	0.18	2.56	55.22	3.92	6.65	68.97
2015	0.38	0.10	0.19	2.80	59.90	4.05	7.33	74.75
2016	0.40	0.12	0.19	2.80	58.51	3.92	7.58	73.51
2017	0.42	0.12	0.19	2.88	60.81	3.94	8.00	76.34
2018	0.44	0.13	0.19	2.97	63.10	3.96	8.41	79.17
2019	0.46	0.14	0.19	3.05	65.40	3.98	8.82	82.00
2020	0.48	0.14	0.19	3.13	67.70	3.99	9.23	84.83
2021	0.50	0.15	0.19	3.21	69.99	4.01	9.64	87.67
2022	0.52	0.16	0.19	3.29	72.29	4.03	10.05	90.50

Source: GHG Platform-India

sector would be 58.3 MT in the year 2022. Figure 3 shows that thermal energy has the highest installed capacity among all energy sectors. Thermal, being a non-renewable source of energy, will not aid in the goal of GHG reduction. However, the data shows that in 2021, the capacity of thermal power has reduced to 57% and the overall contribution of renewable energy has increased to 35.75%.

3.1.2: Progress in renewable energy capacity addition in Andhra Pradesh

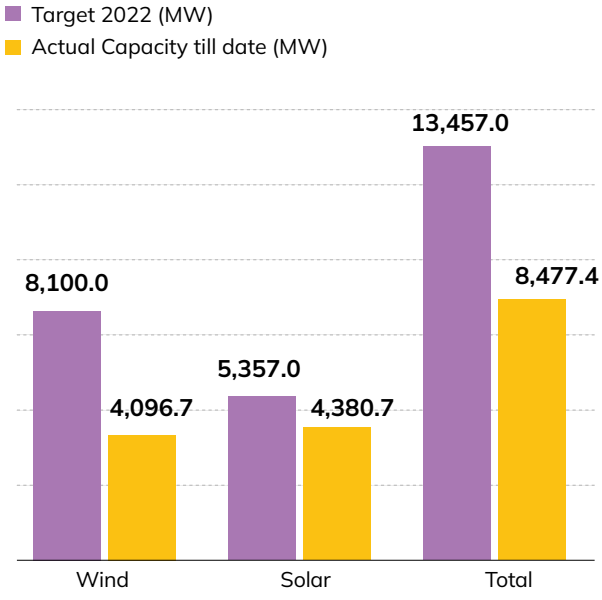
As of December 2021, Andhra Pradesh has achieved a total Renewable Energy capacity of 9190 MW. However, a 2022 NITI Aayog study suggests that Andhra Pradesh has only reached 4% of its total renewable energy potential. Solar and wind energy sectors in Andhra Pradesh have very high potential - 38.5 GW and 44 GW respectively, according to the MNRE. Figure 6 above shows the target vs actual capacity and it can be seen that Andhra Pradesh is still 4978 MW short.

Figure 5: Renewable energy capacity in Andhra Pradesh (MW)

Total capacity	**9,190.51**
Small Hydro Power	162.11
Wind Power	4,096.65
Bio-Power	551.04
BM Power/Bagasse Cogen.	378.10
BM Cogen. (Non-Bagasse)	105.57
Waste to Energy	38.16
Waste to Energy (Off-grid)	29.21
Solar Power	4,380.71
Ground Mounted	4,146.01
Roof Top	146.36
Off-grid/ Distributed	88.34

Source: MNRE progress achievement data (2021)

Figure 6: Target vs Actual Capacity in the renewable energy sector (Wind and Solar)



Source: NITI Aayog, 2022

Figure 7: Trends in Andhra Pradesh's Total Budget Expenditure (TBE) for energy sector budget

	Total state budget expenditure (Rs crore)	Energy sector budget (Rs crore)*	Share of energy sector in total state expenditure (%)
2018-19			
BE	1,91,063.6	4,193.3	**2.19**
A	1,63,960.0	2,187.9	**1.33**
2019-20			
BE	2,27,975.0	6,861.0	**3.01**
A	1,73,700.9	11,693.7	**6.73**
2020-21			
BE	2,24,789.2	7,084.7	**3.15**
RE	1,85,467.6	6,176.1	**3.33**
2021-22			
BE	2,29,779.3	6,637.2	**2.89**

Source: CBGA analysis Of Andhra Pradesh Budget and Detailed Demand for Grants for Energy Department, Andhra Pradesh

3.1.3: Impact of the COVID-19 pandemic on Budget expenditure for various sectors

Figure 7 shows Andhra Pradesh's energy sector expenditure compared to the overall State expenditure for five years. The trend is quite stable, but the onset of the COVID-19 pandemic seems to have caused a variation in the percentage share allotted to the energy sector. There is a dip from 19-20 A(6.73%) to 21-22 BE(2.89%). In 2021-22, amidst the COVID-19 pandemic, the Andhra

Pradesh government increased its health budget allocation by 21.11% or Rs 13,830.44 crore. This is an increase compared to previous year's allocation of Rs 11,419.48 crore. (News Minute, 2021). Hence, there has been a clear shift in priorities for the State mainly towards the health and social welfare sector during this period.

The budget data for other departments also share a similar trend. As it can be seen from Figure 8, the percentage share of all departments has reduced significantly from 2019-20 (A) to 2021-22 BE. The only sector that does not seem to have been impacted by the COVID-19 pandemic is the Panchayati Raj and Rural Development Department. This department shows a rise in expenditure from 2019-20 A(6.6%) to 21-22 BE(8.2%).

Figure 8: Trends in total budget expenditure of different departments and their percentages

Amount (Rs Crore)

	Environment, Forests, Science and Technology	Agriculture and Co-Operation Department and Food, Civil Supplies and Consumers Affairs	Municipal Administration and Urban Development	Panchayat Raj and Rural Development	Transport, Roads and Buildings	Water Resources	State total
2018-19							
BE	4,717.1	13,592.8	7,740.8	23,439.2	4,703.4	16,978.2	1,91,063.6
A	2,550.3	8,860.3	6,562.2	28,422.9	2,610.4	14,355.2	1,63,960.0
2019-20							
BE	7,307.8	22,757.4	6,587.1	31,564.7	6,203.0	13,139.0	2,27,975.0
A	12,015.9	6,334.4	4,877.9	11,502.5	3,011.7	5,335.4	1,73,700.9
2020-21							
BE	7,542.0	15,412.0	8,150.2	16,756.8	6,588.6	11,805.7	2,24,789.2
RE	6,537.7	9,453.5	5,426.2	17,233.7	5,502.9	5,238.0	1,85,467.6
2021-22							
BE	7,443.7	14,906.7	8,727.1	18,912.0	7,594.1	13,237.8	2,29,779.3

Share in State's total budget expenditure (%)

	Environment, Forests, Science and Technology	Agriculture and Co-Operation Department and Food, Civil Supplies and Consumers Affairs	Municipal Administration and Urban Development	Panchayat Raj and Rural Development	Transport, Roads and Buildings	Water Resources
2018-19						
BE	2.5	7.1	4.1	12.3	2.5	8.9
A	1.6	5.4	4.0	17.3	1.6	8.8
2019-20						
BE	3.2	10	2.9	13.8	2.7	5.8
A	6.9	3.6	2.8	6.6	1.7	3.1
2020-21						
BE	3.4	6.9	3.6	7.5	2.9	5.3
RE	3.5	5.1	2.9	9.3	3.0	2.8
2021-22						
BE	3.2	6.5	3.8	8.2	3.3	5.8

Source: CBGA analysis Of Andhra Pradesh Budget and Detailed Demand for Grants for Energy Department, Andhra Pradesh

Figure 9: Loans and Advances routed through Andhra Pradesh Budget (Rs Crore)

Major Head: 6801- Loans for power projects Sub-Minor Head	2016-17 A	2017-18 A	2018-19 A	2019-20 A	2020-21 BE	2020-21 RE	2021-22 BE
07- Loans to APTRANSCO for High Voltage Distribution System (HVDS)	78.7	36.7	0.0	0.0	0.0	0.0	0.0
11- WB & AIIB (World Bank & Asian Infrastructure Investment Bank)	0.0	0.0	184.6	100.2	120.0	95.9	300.0
13- KFW - Germany - Green Energy Corridors Intra State Transmission System in Andhra Pradesh	30.3	187.6	62.4	0.0	27.0	0.0	22.1
06- Loans to Andhra Pradesh Transmission system in Hyderabad Metropolitan Area	0.0	40.0	0.0	0.0	0.0	0.0	0.0
07- Loans to APTRANSCO for High Voltage Distribution System (HVDS)	6.0	7.1	0.0	0.0	0.0	0.0	0.0
11- WB & AIIB (World Bank & Asian Infrastructure Investment Bank)	0.0	0.0	40.7	10.1	72.0	0.0	18.5
13- KFW - Germany - Green Energy Corridors Intra State Transmission System in Andhra Pradesh	0.0	35.0	0.0	0.0	5.0	0.0	4.5
07- Loans to APTRANSCO for High Voltage Distribution System (HVDS)	1.5	0.6	0.0	0.0	0.0	0.0	0.0
11- WB & AIIB (World Bank & Asian Infrastructure Investment Bank) - Loans for APTRANSCO for 24X7 Power for all Project	0.0	0.0	12.7	13.1	20.0	0.0	57.6
13- KFW - Germany - Green Energy Corridors Intra State Transmission System in Andhra Pradesh	0.0	15.0	0.0	0.0	2.0	0.0	1.4
05- Loans to APTRANSCO for Servicing loans taken by the DISCOMS	0.0	0.0	0.0	4,689.7	0.0	0.0	0.0
Total	**116.4**	**322.0**	**300.3**	**4,813.0**	**246.0**	**95.9**	**404.1**

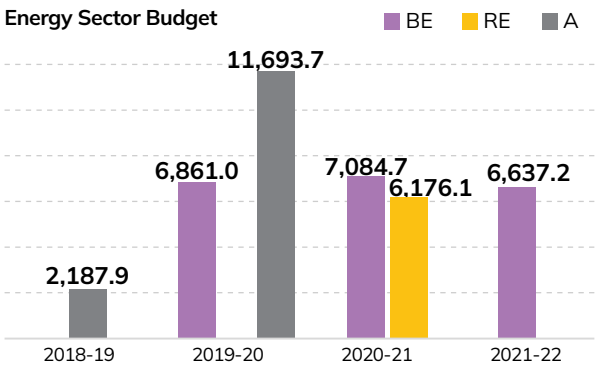
Source: Detailed Demand for Grants for Odisha State Energy Department (Energy Department, Odisha Government 2021)

3.1.4: Tracking the financial resources available with Andhra Pradesh for expenditure on clean energy initiatives

The State's budget resources for power sector financing

The Budget of Andhra Pradesh's Energy department is estimated to be Rs. 6,637 crores for FY 2021-22 (BE). No grants were recommended for the renewable energy sector for any State in the Fourteenth and Fifteenth Finance Commission.

Figure 10: Budgetary allocation by the Andhra Pradesh Energy Department (Rs crore)



Source: Detailed Demand for Grants for Andhra Pradesh State Energy Department (Energy Department, Andhra Pradesh Government 2021)

Below is the approximate estimate of finances from different channels contributing to the State's Budget resource envelope for energy financing.

Section II: Understanding the responsiveness of State budgetary expenditure on clean energy transition (Objective 2)

3.2.1 Understanding climate change (mitigation) responsiveness of state power sector budget

We followed the above-described methodology to categorise the line expenditure of the power budget and assess its climate responsiveness .As described, the budget is categorised into five main parts based on priority — Highly Favourable, Quite Favourable, Neutral, Unfavourable and Undefined.

Through the summation of category-wise expenditure, it was found that spending on promotion of renewable energy is miniscule in Andhra Pradesh's power sector budget. The State needs to prioritise renewable energy.

Figure 11 and 12: Andhra Pradesh power sector budget expenditure responsiveness towards climate change mitigation

Figure 11: Amount under various categories (Rs crore)

	Highly Favourable	Quite Favourable	Neutral	Unfavourable	Total
2017-18 A	317.4	382.2	36.4	3,300.0	4,035.9
2018-19 A	65.7	829.5	42.7	1,250.0	2,187.9
2019-20 A	3.6	6,676.6	93.6	4,919.8	11,693.7
2020-21 RE	4,047.9	2,034.3	94.0	0.0	6,176.1
2021-22 BE	4,532.5	1,914.5	190.2	0.0	6,637.2

Figure 12: Various categories' share in total expenditure (%)

	Highly Favourable	Quite Favourable	Neutral	Unfavourable	Total
2017-18 A	7.9	9.5	0.9	81.8	100.0
2018-19 A	3.0	37.9	2.0	57.1	100.0
2019-20 A	0.0	57.1	0.8	42.1	100.0
2020-21 RE	65.5	32.9	1.5	0.0	100.0
2021-22 BE	68.3	28.8	2.9	0.0	100.0

Source: CBGA analysis Of Andhra Pradesh Budget and Detailed Demand for Grants for Energy Department, Andhra Pradesh

Figure 13: Percentage share of different interventions/schemes within the "Highly Favourable" category

% Share of different interventions within Highly Favourable Category

	2017-18 A	2018-19 A	2019-20 A	2020-21 RE	2021-22 BE
Renewable Energy Scheme (Major Head 2810)	23.3	0.0	0.0	0.0	0.0
Hydro Power	1.4	5.0	100.0	0.0	0.1
Y.S.R. Nine Hour Free Power Subsidy(Solar Based)	0.0	0.0	0.0	99.8	99.3
Green Energy Corridor, Assistance to PSUs for- APSEEDCO for Energy Efficiency , APGECo (AP Green Energy Corporation)	75.3	95.0	0.0	0.2	0.6

Source: CBGA analysis Of Andhra Pradesh Budget and Detailed Demand for Grants for Department of Energy, Andhra Pradesh

Figure 14: State institutes working towards Green Economic Recovery

Function	Central level	State level in Andhra Pradesh
Policy	Ministry of New and Renewable Energy, Ministry of Power, Central Electricity Authority	State Nodal agency - New and Renewable Energy Development Corporation of Andhra Pradesh (NREDCAP)
Regulation	Central Electricity Regulation Commission	Andhra Pradesh State Electricity Regulation Commission (APSERC)
Generation	Central Sector Undertakings (e.g., NTPC, NHPC)	Andhra Pradesh Power Generation Corporation (APGENCO)
Transmission	Central transmission Utility (e.g., Power Grid Corporation of India Ltd.)	Transmission Corporation of Andhra Pradesh (APTRANSCO)
Distribution		Andhra Pradesh Southern Power Distribution Corporation (APDISCOM)

Figure 15: Various policies initiated by the State government

	Policy Name	Policy Brief
RE Export Policy	Andhra Pradesh Renewable Energy Export Policy (2020)	Power generated from solar and wind projects would be exported outside the State. Resource allocation on a "first-come, first-serve" basis by the Nodal Agency by seeking online applications. Priority will be given to project developers intending to set up energy export projects along with manufacturing facilities in the State.
Solar	Andhra Pradesh Solar Power Policy-2018	To achieve a minimum total solar power capacity addition of 5,000 MW in the next five years in the State with a view to meet the growing demand for power in an environmentally sustainable manner. To develop solar park(s) with necessary utility infrastructure facilities to encourage developers to set up solar power projects in the State. To deploy solar-powered agricultural pump sets to meet power requirements of farmers. To promote local manufacturing facilities which will generate employment in the State.
Wind	Andhra Pradesh Wind Power Policy-2018	To encourage, develop and promote wind power generation in the State with a view to meet the growing demand for power in an environmentally and economically sustainable manner. To attract private investment to the State for the establishment of large wind power projects. To promote investments for setting up manufacturing facilities in the State, which can generate gainful local employment.
Solar-Wind	Andhra Pradesh Wind-Solar Hybrid Policy - 2018	To achieve renewable energy capacity of 18000 MW by the year 2021-22. To provide a framework for the promotion of large grid-connected wind-solar PV systems for optimal and efficient utilisation of transmission infrastructure and land, reducing the variability in renewable power generation and thus achieving better grid stability. Offered incentives are: ● 50% of the cross-subsidy surcharge shall be paid for third party sale provided the source of power is from wind-solar hybrid power projects setup within the State. ● Transmission/distribution charges are exempted up to 50% of the applicable charges for wheeling of generated power.

The State's power budget was analysed, and expenditure categorised according to this climate mitigation impact. The largest share in budget expenditure is categorised as "Quite Favourable". This is primarily because Andhra Pradesh has spent much capital on secondary aspects such as transmission and distribution or rural electrification that indirectly helps in the reduction of GHG emissions. Moreover, it is only to achieve a short-term goal. Appendix 1 provides the rationale used for categorisation and Annexure I describe the detailed methodology and shows its application on the CBGA website.

Section III: Policy and institutional landscape of climate mitigation policies in the energy, transport and urban development sectors and assessment of State participation in key Union government schemes and programmes of climate relevance (Objective 3)

3.3.1 Policy and institutional landscape for climate mitigation in Andhra Pradesh

Figure 14 and Figure 15 below highlight institutes and organisations in the State that work towards the goal of GHG reduction and achieving a Green Economic Recovery.

There are various other State departments, which deploy clean energy technologies under their developmental schemes in coordination with the Department of Energy, Infrastructure, and Investment Department and the NREDCAP. These departments support the State's actions for the addition of clean energy, energy efficiency and other climate change mitigation actions such as deploying low carbon transport system and waste-to-energy projects. Most schemes and programmes are designed based on the policy guidelines of the Central government. Various departments work with dedicated State corporations and Central Ministries or PSUs for implementing various State schemes and programmes. The Andhra Pradesh government is making efforts to promote the decentralised application of renewable energy through various programmes and schemes. However, many of these schemes have no allocations after 2018-19 onwards.

Figure 16: Expenditure in solar sector in Andhra Pradesh (Rs Crore)

Minor head	00-	01- Bio-Energy	**01- Bio-Energy**	00-	01- Bio-Energy	01- Bio-Energy
Sub-minor head	796- Tribal Area Sub-Plan	796- Tribal Area Sub-Plan	**796- Tribal Area Sub-Plan**	800- Other Expenditure	800- Other Expenditure	800- Other Expenditure
Detailed head	05- Solar Energy Programme	05- Solar Energy Programme	**12- Solar Water Heating System Programme**	05- Solar Energy Programme	05- Solar Energy Programme	12- Solar Water Heating System Programme
Object head	310- Grants-in-Aid	310- Grants-in-Aid	**310- Grants-in-Aid**	310- Grants-in-Aid	310- Grants-in-Aid	310- Grants-in-Aid
2015-16						
A	0.4	0	0	1.6	0	0
2016-17						
BE	0	0.5	0.25	0	2.5	0.5
RE	0	0.5	0.25	0	2.5	0.5
A	0	0.5	0	0	2.5	0.5
2017-18						
BE	0	0.5	0.25	0	2.5	0.5
RE	0	0	0	0	0	0
A	0	0.5	0.25	0	2.5	0.5

Source: CBGA analysis Of Andhra Pradesh Budget and Detailed Demand for Grants for Energy Department, Andhra Pradesh

3.3.2 Andhra Pradesh Policy landscape for promotion of low- carbon development at urban sector

The Municipal Administration and Urban Development Department is responsible for the growth, development, and management of urban areas in the state. There are several schemes set up by the Union and State governments for urban development such as Atal Mission for Rejuvenation and Urban Transformation (AMRUT), Smart Cities project, Swachh Bharat Mission etc. It should be noted that these schemes do not have segregated budgeted information for interventions with climate relevance or a specified renewable energy component. (For a detailed breakdown on the distribution of funds, refer to Annexure 2)

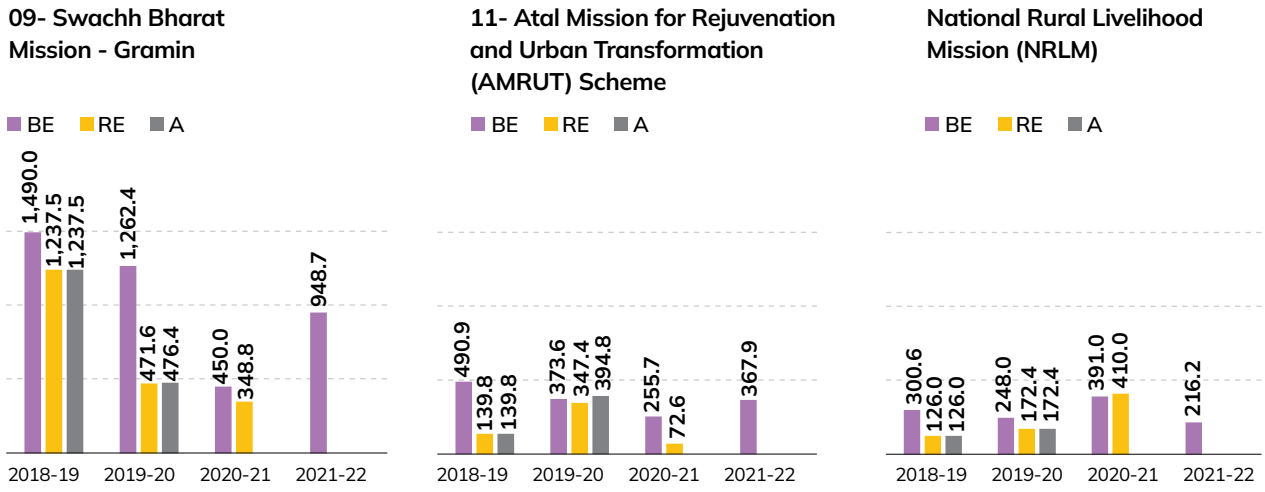
Figure 17: Central Sector Schemes

State Government Department	Other collaborating State PSU / Company and Central PSU	State project	Central Scheme
Agriculture and Fisheries Department	NREDCAP and APDISCOM, MNRE	Solar PV water pumping Programme	Decentralised Renewable Energy Power (for example, the recently launched KUSUM scheme)
Panchayats and Rural Development Department	NREDCAP and AP TRANSCO	Solarisation of borewell NTR Jalasiri phase -II	Decentralised Renewable Energy Power
Industries and Commerce Department	NREDCAP	Industries and Commerce Policy for 25 percent subsidy for RET installation for industrial use	Renewable Energy Schemes by MNRE
Municipal Administration & Urban Development Department	Swachh Andhra Corporation (SAC)	Waste to Energy Projects	Swachh Bharat Abhiyan
Municipal Administration & Urban Development Department	NREDCAP, APDISCOM, APSEEDCO	Energy efficient street lighting	Street Lighting National Project (SLNP)in urban areas
Panchayats and Rural Development Department	APSEEDCO, NREDCAP and EESL as Central PSU	Panchayat LED street lighting	Street Lighting National Project (SLNP) in rural areas.
Industries and Commerce Department	Ministry of Heavy Industries & Public Enterprises, Government of India and EESL	Promotion of EV/ battery manufacturing Electric Mobility Policy Implementation 2018-2023	FAME India Scheme (Scheme for faster adoption and manufacturing of hybrid electric vehicles)
Roads and Transport Department and, Municipal Administration & Urban Development Department	Ministry of Housing and Urban Affairs (Central)	Metro rail in Smart cities such as the new capital city of Amaravati	New Metro Rail policy 2017

Source: CBGA's compilation from various policy documents of the Andhra Pradesh government

Figure 18: Expenditure in various urban development schemes (Rs Crore)

Major head	Panchayat Raj and Rural Development	Municipal Administration and Urban Development	Panchayat Raj and Rural Development
Minor Head	2215- Water Supply and Sanitation	2217- Urban Development	2515- Other Rural Development Programmes
Sub-Minor Head (Scheme)	09- Swachh Bharat Mission - Gramin	11- Atal Mission for Rejuvenation and Urban Transformation (AMRUT) Scheme	National Rural Livelihood Mission (NRLM)



Source: CBGA analysis of Andhra Pradesh State Budget and Detailed Demand for Grants for Department of Energy, Andhra Pradesh Energy, Andhra Pradesh

3.3.3 Andhra Pradesh policy landscape for financing and promotion of low-carbon development of the transport sector

The Andhra Pradesh government passed the Electric Mobility Policy 2018-23 to promote Electric Vehicles (EVs). According to the policy, by 2024, one lakh EV charging stations will be built, all government buses and commercial vehicles will be made electric and Rs 30,000 crore would be invested by the State. While a dedicated State-level corporation, the Smart Mobility Corporation will be established to implement this policy, an MoU has already been signed with the Central PSU Energy Efficiency Service Limited (EESL) for operational guidance. The EESL, for the first time, has entered into an agreement with NREDCAP and APDISCOMs for the supply of 1 lakh EVs in February 2018. Other targets mentioned in the policy are:

I. To convert 100% of Andhra Pradesh State Road Transport Corporation 's (APSRTC) bus fleet of over 11,000 buses into electric buses (Battery Electric Vehicles or Fuel Cell Electric Vehicles) by 2029, with the first phase being 100% conversion in top four cities by 2024.

II. Phase out all fossil-fuel based commercial fleets and logistics vehicles in top four cities by 2024 and all cities by 2030.

III. All forms of government vehicles, including vehicles under government corporations, boards and government ambulances etc. will be converted to EVs by 2024.

Some incentives offered under the policy are:

I. Complete reimbursement of road tax and no registration fee for development of EVs manufacturing parks

II. 10% of Fixed Capital Investment (FCI) up to a maximum of Rs. 20 crores for first two units under the large vehicle category in each segment of EVs (two-wheelers, three-wheelers, four-wheelers, buses), battery and charging equipment, hydrogen storage and fuelling equipment manufacturing.

III. Stamp duty reimbursement for purchase or lease of land and State GST reimbursements

Some investment declarations by the State departments under the policy are:

I. The State power DISCOMs will invest in setting up both slow and fast charging networks in government buildings and other public places. These charging points will be accessible to both government and private vehicles.

II. DISCOMs will set up the charging infrastructure on its own or through third-party operators using appropriate Public Private Partnership (PPP) models. Such costs can be recovered as part of the Aggregate Revenue Requirement (ARR).

III. APSRTC depots, bus terminals and bus stops will have charging stations.

IV. Public parking spaces will be mandated to have charging stations.

V. Government buildings will prepare a roadmap to set up charging or swapping stations in all of its parking spaces.

VI. Charging networks will be installed at least every 50 km on highways, other major roads etc.

Besides these pioneering efforts to create an EV policy, Andhra Pradesh's EV market is at a nascent stage. Figure 19 depicts the total number of EVs sold in the State.

Figure 19: Total EVs sold in Andhra Pradesh

Vehicle Type	Model	Total
Four-wheelers	M1	2
Two-wheelers	L2	675
Three-wheelers	L5M	339
Three-wheelers	e-rickshaw	29
Two-wheelers	L1	4,638
Three-wheelers	e-cart	1,177
Three-wheelers	L5N	130
Total		**6,990**

Source: FAME-II Ministry of Heavy Industries portal accessed in January 2022

Hence, the role of the State government is very important in progressively accelerating adoption, diffusion, and deployment of electric mobility. The State bus transport system, which is managed by the Andhra Pradesh State Road Transport Corporation (APSRTC), is also facing many problems such as low productivity, conflicts with trade unions, capacity shortages and financial constraints. It is equally important to bridge these existing gaps in operations when introducing new EV policies or establishing an understanding with investors.

Until recently, the APSRTC was seeking a "demand creation incentive" for proposals from operators for procurement, operation and maintenance of 350 electric buses under the Centre's FAME scheme. Demand incentives under FAME are offered in the form of an upfront reduced purchase price, which will be reimbursed to the original equipment manufacturer (OEM) by the Government of India. Such a demand-generating incentive is meant to provide an initial push to electric mobility. The State government may have to find ways of "future pricing the operation of e-buses" by leveraging the expertise of different stakeholders to make sustained efforts for the adoption of electric mobility.

Figure 20: Andhra Pradesh government spending on fuel-based public transport (Rs crore)

Department	Transport, Roads and Buildings						
Sub-Minor Head	43- Assistance to APSRTC for purchase of buses	43- Assistance to APSRTC for purchase of buses	**43- Assistance to APSRTC for purchase of buses**	05- Loans to APSRTC for purchase of buses	05- Loans to APSRTC for purchase of buses	05- Loans to APSRTC for purchase of buses	**05- Loans to APSRTC for purchase of buses**
Detailed Head	310- Grants-in-Aid	310- Grants-in-Aid	**310- Grants-in-Aid**	001- Loans to APSRTC for purchase of buses	001- Loans to APSRTC for purchase of buses	001- Loans to APSRTC for purchase of buses	**001- Loans to APSRTC for purchase of buses**
2017-18							
BE	0.0	0.0	**0.0**	230.0	0.0	9.0	**239.0**
A	0.0	0.0	**0.0**	230.0	19.0	0.0	**249.0**
2018-19							
BE	150.0	50.0	**200.0**	0.0	0.0	0.0	**0.0**
A	120.0	40.0	**160.0**	0.0	0.0	0.0	**0.0**
2019-20							
BE	50.0	0.0	**50.0**	0.0	0.0	0.0	**0.0**
A	50.0	16.7	**66.7**	0.0	0.0	0.0	**0.0**
2020-21							
BE	0.0	0.0	**0.0**	0.0	0.0	0.0	**0.0**
RE	0.0	0.0	**0.0**	0.0	0.0	0.0	**0.0**
2021-22							
BE	0.0	0.0	**0.0**	0.0	0.0	0.0	**0.0**

APSRTC: Andhra Pradesh State Road Transport Corporation
Source: Detailed Demand for Grants for Transport, Road and Buildings Department, Government of Andhra Pradesh

Demand incentives under the FAME-II scheme offered by the Central government's Department of Heavy Industry (DHI) are to the tune of Rs. 20,000 per KWh for buses and trucks. The maximum number of e-buses to be supported across India is 7,090. The Andhra Pradesh government cannot wholly depend on this scheme to achieve its State target of 100% conversion of all buses to EVs by 2029. In terms of fiscal incentives offered through budgetary support by the State government, there is no allocation from its budgets for the purchase of EV buses yet. Surprisingly, there are no allocations for the purchase of fuel-based buses after the 2019-20 budget. This might be due to the poor fiscal health of the Andhra Pradesh government.

3.3.4 Various interventions of the Andhra Pradesh government for clean energy initiatives in the agriculture sector – solar-based agriculture pumps

The Department of Agriculture and Fisheries Department along with NREDCAP & APDISCOMs have jointly implemented the Solar PV Water Pumping programme since 2014-15. The Central government has recently launched a new scheme called Kisan Urja Suraksha Evam Utthaan Mahabhiyan' (KUSUM), which allows solarisation of existing grid-connected agriculture pumps to make farmers independent of grid supply and enabling them to sell surplus power generated to the APDISCOMs and get extra income. In coming years, the Solar PV Water Pumping programme will be further extended as an income generation opportunity for the farmers. The extended Solar PV programme will help in reducing the financial burden of the APDISCOMs due to the electricity subsidy given to farmers. (CBGA AP analysis, 2020)

Besides these standalone solar-based agriculture pumps under KUSUM, the Andhra Pradesh

government has made significant improvements in the agriculture sector and its GHG emission goals. One of the major sources of GHG emission in this sector is the consumption of electricity. The government has announced that it will purchase electricity from the Solar Energy Corporation of India (SECI) in 2024 and will supply it free of cost to over 18 lakh farmers across the State for nine hours a day. (Indian Express, 2021) In order to make this process more sustainable, the State government has planned to set up a 10, 000 MW solar power project through the State-run Green Energy Corporation Limited to generate power for the next 25 years. This might reduce the subsidy burden of the government with the supply of cheaper renewable energy to the farmers.

3.3.5 Andhra Pradesh initiatives for up-skilling youth and women for job opportunities in climate change mitigation

The Andhra Pradesh government has introduced a few upskilling schemes with an aim to create jobs and aid in a Green Economic Recovery. A few important schemes are: -

3.3.5.1 Pradhan Mantri Kaushal Vikas Yojana (PMKVY)

PMKVY is the flagship scheme of the Ministry of Skill Development & Entrepreneurship (MSDE). It is implemented by the National Skill Development Corporation (NSDC). The objective of this skill certification scheme is to enable a large number of Indian youths to take up industry-relevant skill training that will help them in securing a better livelihood.

3.3.5.2 Electronics System Design and Manufacturing (ESDM)

This scheme aims at upskilling students/unemployed youth in the ESDM sector by:

- Encouraging new investments in training in the ESDM sector by industry.
- Utilising those who are undergoing studies in schools (IX standard onwards)/ITIs/Polytechnics/ UG colleges (non-engineering) and school dropouts/unemployed youth by providing them with additional skills that are recognized by industry for employment in the ESDM sector.
- Facilitating the evolving of processes/norms for (1) certification of various courses (2) providing opportunities for moving up the value chain and (3) recognition of institutions for conducting such courses, as per requirement of Industry in the ESDM sector.

3.3.5.3 Integrated pest management (IPM)

IPM has been introduced in India to reduce the serious impact of highly toxic pesticides on people's health and the environment. It is taught in farmer field schools and is an effective educational approach for building the essential knowledge and decision-making skills among farmers. The goal in IPM is to reduce pesticide application in farming and reduce harvesting time.

3.3.5.4 Rural development & self-employment training institute (RUDSETI)

This training programme targets women and unemployed youth of the State. A majority of the women who started their small business units soon after the RUDSETI training possessed some basic knowledge in their respective trades. This not only led to an increase in the availability of capital for the backward sections of the society, but also creates financial independence.

The Andhra Pradesh government is also implementing some central sector schemes such as the Suryamitra Skill Development Programme, the aim of which is to train individuals for employment in the Solar Sector.

3.3.5.5 Suryamitra Skill Development Programme (SSDP)

The MNRE has mandated the National Institute of Solar Energy as the nodal agency for implementation of the Suryamitra Skill Development Programme). The goal of this programme is to improve the skills of the youth so that they can capitalise on the jobs created by the solar industry. They would be well-equipped to work on the operation and maintenance and their skills can be useful in India and abroad as well. As part of the SSDP, the candidates will also be prepared to become new entrepreneurs in the solar energy sector. This would also be a part of the Make in India scheme. This is a 600-hour residential program. Andhra Pradesh has two training centres for SSDP located at Visakhapatnam and Prathipadu. (Suryamitra Web portal)

Section IV

Key Observations and Inputs for Policy Measures

The COVID-19 pandemic has affected multiple sections of the society: from environment, health and hygiene to polity and governance. To recover in a sustainable manner, the State has to take a more holistic approach and be more inclusive and transparent in its Green budget finances. The State's solar program, even though it has been progressing well, needs to be better structured to achieve its total potential. Capital investment and infrastructure in the renewable energy sector would be of no use if the State does not have enough skilled and trained individuals. Hence upskilling is also of great importance.

The Government of Andhra Pradesh funds the majority of off-grid renewable energy projects, such as solar water heating systems, upgraded chullahas, and other solar energy projects, like solar lights. The State budgetary allocations are unpredictable in terms of trends, which is mostly owing to the elimination of various state programmes, or their transfer to State PSUs or their subsuming into other Central government schemes. State government funding has traditionally been used to assist small-scale renewable energy projects (such as Electrification of Dalit Settlements, etc.) in distant locations where private investment is minimal.

There is a need to have greater transparency in State climate finance data. It has been seen that clarity on available finances, their specific objectives and conditions increase investor confidence and lead to better utilisation of available finances. The State government could create an online dashboard of finances available for climate change mitigation actions. This will enable more transparency and accountability.

Since EVs have long-term sustainability and other benefits associated with them, the Andhra Pradesh government could allocate a part of its budget to create an EV-supporting infrastructure instead of purchasing fuel-based buses. Such a budget-neutral approach would enable the government to deploy supporting infrastructure for EV mobility or undertake other activities such as consumer awareness programmes without incurring an additional financial burden.

In the initial phases of EV penetration, the aim of the Andhra Pradesh Government should be to gradually reduce dependence on fuel-based public transport and develop an e-public transport system, by allocating adequate financial resources for the demand side or EV supporting infrastructure.

Here are a few key observations:

- From 2015 to 2018, State budgetary allocations for the transport sector were mostly sourced through loans. Currently, there is no information on government investments for the promotion of EVs and no disaggregated budget data is available for interventions aimed at creating EV infrastructure such as charging stations.

- Solar projects are vital to achieving clean energy targets, but there needs to be a holistic

approach to involve them in the State's schemes. For example, the State's decision to augment the capacity of solar power by offering it under the YSR Nine-Hour Free Power Supply Programme for farmers.

- Andhra Pradesh is one of the few States in India that has invested heavily in wind energy. According to the new Wind-Solar Policy, wind and solar projects would reduce transmission and distribution costs by half. This is a great incentive to promote renewable energy in the State.

- The waste management aspect of the circular economy has been neglected in the State's climate finance. Budget documents suggest a significant expenditure in central schemes such as Swachh Bharat Mission and AMRUT, but it is not specifically mentioned.

- Other State departments such as the Panchayat Raj and Rural Development Department, are also deploying decentralised renewable energy projects in rural areas. The Jalasiri Phase–II programme features the installation of solar pump sets for pumping water from wells for irrigation.

- A boost in the State's skilling program in renewable energy sector is needed and in the initial stages, the AP government could take help from the centre or follow the models used by states like Bihar, Odisha that have successfully implemented such programs.

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Annexure 1A

A Methodological Guidance Note on Assessing Climate Responsiveness of Andhra Pradesh Power Sector Financing

1. Scope of Methodology

Thermal Power Generation contributes highest towards GHG emissions among all the sectors in India and similar scenario exist at the state level. The onus of implementing the national ambition for clean energy transition largely lies with state governments and their climate policy. Financing of states' climate policy are demonstrated through their budgets responsiveness. Budget expenditure can have a positive responsiveness on the climate if it represents measures for mitigation or a negative role if it directly or indirectly supports the use of fossil fuel based power generation. However, assessing the climate responsiveness of budgets requires a methodological process as it's not always easy to determine it and to have conclusive insights to the policy makers. It therefore seems necessary to develop this methodological guidance note, which offers a framework for assessing responsiveness of States' power sector budget in financing of climate change mitigation (reducing GHG emissions) interventions. The objective is to improve the responsiveness of the budget for climate mitigation through ensuring that actions and investments progressively eliminate expenditure with a negative responsiveness on the climate wherever possible, and increase expenditure that supports the clean energy transition. . This will assist in designing well thought-out proposal for greening the economic recovery of states by identifying climate relevant expenditures for investors, meeting demands for transparency in climate financing and promoting information on cross-sectional issues.

The ultimate outcome of applying this methodological guidance is to provide better understanding of the coherence of states' public expenditure with reaching climate mitigation targets with respect to power sector, to make progressive public climate finance policy, which enables Green Economy Recovery following the pandemic shocks

2. Steps involved in Assessing Climate Responsiveness of State Budgets

Several steps are involved in assessing climate responsiveness of budgets. The major three steps are:

1) **Identification of scope of expenditure** in terms of identifying the department (s) mandated with functions of Power sector development. At scoping stage, it sets out the expenditure items (pertaining to nodal Departments) that are to be included and those that are out of scope. Receipt budget expenditure is kept in scope of analysis.

2) **Identification of Budget lines that is, neutral or "with climate responsiveness"** in terms of identifying the budget lines which 'with climate responsiveness' and expenditure items that are described as 'neutral'. Then, the expenditure items 'with climate responsiveness' are to be

analysed in depth, most often by analysing supplementary information in addition to budgetary or financial data. There are five tiers of information in Budget accounts that are- Major heads, Sub- major heads , Minor Head, Detailed Head, Object Head. Identification of the budget lines into three categories - "with climate responsiveness" or neutral, is carried out by unifying the information lying in these five tiers of information (by concatenating them).The decision criteria for identifying the budget lines with neutral or "with climate responsiveness" is as follows:

1. **Neutral:** This expenditure does not have a significant responsiveness on emissions or on capturing greenhouse gases. It therefore does not actively contribute to climate change, nor does it help reduce GHG emissions Examples: social benefits to employees, salaries, and administration travel, recoveries and food allowances.

2. **With climate responsiveness:** This expenditure is compatible with a national ambition for climate change mitigation particularly for Renewable Energy. It provides a significant reduction in emissions compared to existing alternatives. For example, Addition of Renewable Energy, Transmission and distribution network, Electrification using off – grid technologies etc.

3) **Analysis on Priorities of expenditure "with climate responsiveness":** The aim of this third stage of analysis is to identify the climate responsiveness of all expenditure included in the budget of Power Department of the State Governments. It consists of an analysis of the budget line by line, based on rationale-based categorization of actions. Actions are then, rated as **highly favorable, quite favorable, or unfavorable or undefined category for** the climate. The results provide a better understanding of the coherence of expenditure with reaching clean energy transition, to make progressive budget decisions for greening the economy recovery. Expenditure items are classified into three categories according to their responsiveness on the climate:

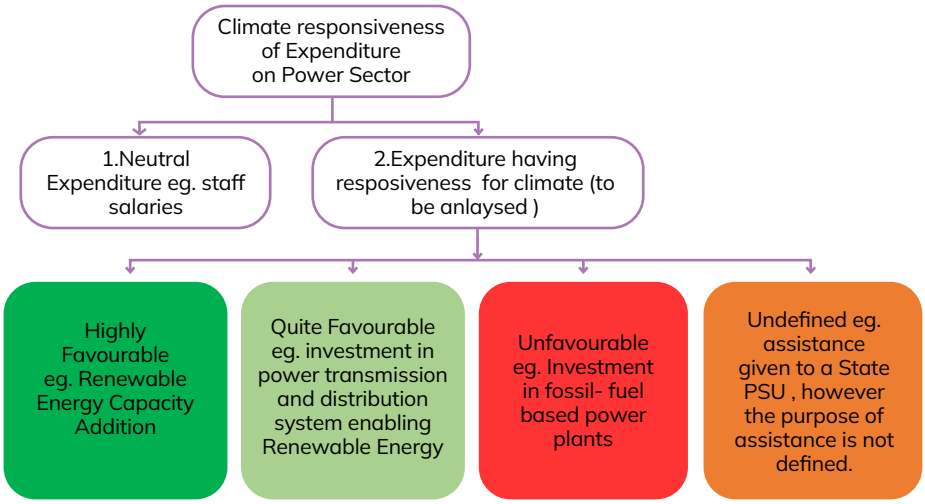
i. **Highly Favorable:** This expenditure is coherent with national ambition for climate change mitigation. Expenditure on this activity provides a significant reduction in emissions compared to existing alternatives. For example: Installation of Renewable Energy Capacities

Figure A1: Climate Responsiveness Categorization

Step 1: Identification of key department(s) for power sector

Step 2: Identification of Budget lines that is, neutral or "with climate mitigation responsiveness"

Step 3: Rating the responsiveness of budget expenditure for Climate Change Mitigation (clean energy transition)



ii. **Quite Favorable:** This expenditure reduces emissions in the short term, but the reduction is insufficient to put the area on the path to low carbon development. This category notably includes equipment and infrastructure that present a risk of carbon lock-in the long term. For example; Transmission and distribution network

iii. **Unfavorable:** This expenditure is non -coherent with the Indian commitment for climate change because it makes a significant contribution to greenhouse gas emissions. For example, Subsidies for diesel based pumps or fossil fuel based power generation

iv. **Undefined:** This expenditure cannot be categorised in above three ratings, as these require extra –budgetary supplementary information and need to be discussed with State Government.

3. Rationale used for categorisation of Expenditure on climate change mitigation

We unified the five tiers of budget information for rating the responsiveness of budget expenditure for climate change mitigation particularly for clean energy transition. Broadly, rationale used for categorization of budget expenditure of states is as follows;

Categories of Budget Responsiveness

Highly Favourable | Quite Favourable | Neutral | Unfavourable

	Nature of Budget Expenditure	Rationale for Categorisation
1	New and Renewable Energy Related Expenditure (major Head 2810)	This expenditure under major Head 2810, support a transition to a low carbon development (LCD) of power sector with promotion of renewable energy.
2	Expenditure related to Hydroelectric Power Generation	Budget lines related to “hydropower generation” categorised under highly favorable category as the government, under New Hydroelectricity Policy, has approved ‘renewable energy status’ for large hydel projects. Earlier, only smaller projects of less than 25 Megawatt (MW) in capacity were categorised as renewable energy. In addition, the large-scale hydro projects are considered as the separate source of energy. Hence, Expenditure related to maintenance, equipment supplies, installation and head works has been put under Tungabhadra Hydro-Electric (Joint) Scheme
3	Expenditure is meant for providing Grant-in- aid Assistance in Public sector and other undertakings which are explicitly mandated only for renewable energy	This expenditure is categorised as Highly Favourable such as Assistance to Andhra Pradesh Green Energy Corporation Limited
4	Expenditure related to Energy Efficiency Initiatives	Improving energy efficiency is the key tool in reducing the GHG emissions besides addition of Renewable Energy and Energy Conservation for example, *Assistance to Andhra Pradesh State Energy Efficiency Development Corporation*, has been assigned under highly favorable category.

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Annexure 1A

Categories of Budget Responsiveness

Highly Favourable | Quite Favourable | Neutral | Unfavourable

	Nature of Budget Expenditure	Rationale for Categorisation
5	Expenditure related to Transmission and distribution networks	Expenditure in Transmission and Distribution infrastructure supports the integration of renewable energy into the power grid. It supports parallel development of low carbon power generation capacity using renewable along with transitioning away from fossil fuel based energy. However, a dedicated corridor being constructed through KFW funding assistance in Andhra Pradesh and since it is dedicated to Renewable Energy Transmission, it is categorized in Highly favourable Category.
6	Expenditure related to intra-state (within the state) distribution networks	Expenditure in Interstates Distribution infrastructure supports the integration of renewable energy through improving robustness of power system with reduction in Average Transmission, Distribution & Commercial (AT& D) losses shown by the power utilities in states and indirectly supports state in promotion of net-metered based off-grid RE technologies installation.
7	Expenditure with respect to Rural Electrification Programmes by States	Most of the expenditure with respect to Rural electrification are done under Central Sponsored Schemes such as SAUBHAGYA- *Pradhan Mantri Sahaj Bijli Har Ghar Yojana, Deendayal Upadhyaya Gram Jyoti Yojana (DDUGJY)* or State own initiatives for rural electrification. The scope of work of the DDUGJY and most of the rural electrification programmes includes agriculture feeder separation, laying down low tension electric lines, strengthening and augmentation of sub-transmission and distribution network in rural areas for electrification. This is leading to support a parallel development of low carbon power generation capacity using renewables in the end.
8	Expenditure on Free Power (Largely Fossil Fuel based) Supply to Farmers till 2019-20 under YSR nine hour free power supply	This expenditure is causing huge burden on the state government and at the same time derailing the transition towards clean energy adoption and thus, categorised as unfavourable. There is a need to develop a road map by states in phasing down the free subsidies of fossil fuel based power supply as it reduced market scalability of off-grid RE technologies and lock -in state expenditure in technologies unfavourable to reducing GHG emission and inconsistent with goals of promoting solar based agriculture pumps / other off- grid RE technological solutions. Government of Andhra Pradesh has been providing free electricity to farmers until 2019 -20 and hence the budget expenditure prior to 2019-20 is categorized in unfavourable Category.
9	Expenditure related to salaries, pay allowances and secretariat related work	This expenditure does not have a significant responsiveness on emissions. It therefore does not actively contribute to climate change, nor does it help reduce GHG emissions. Expenditure is for administrative or secretariat purpose, salaries, allowances etc. However, expenditure related to salaries of employees specified under Renewable Energy Department is categorised as Highly Favorable Category.
10	Expenditure on Solar- Based Power Supply to Farmers, 2020-21 onwards.	Following year 2020-21, Government of Andhra Pradesh took decision of feeding solar energy for agriculture consumption. The A.P. State government shown its commitment in providing nine hours of quality free power to farmers and has approved a proposal to set up 10,000 MW of solar power projects. A state Government order issued by the Energy Department mentions that the new project aims at switching to solar power, which costs less, and providing nine hours free power supply to agricultural consumers. Since, Government has already commissioned solar power project for the purpose of agriculture consumption and subsidies. Government is giving subsidies to farmers for Renewable Energy based free power supply after this order implementation in year 2020-21. This version of methodology is categorizing this expenditure under the YSR scheme post year 2020-21 into highly favorable category.

1 Andhra Pradesh Government Order No. MS-18 dated 15-06-2020, Abstract Providing nine hours day time free power supply to the Agricultural Sector on a sustainable basis - Establishment of 10,000 MW's of Solar Power Projects- Approval of Proposals of APGECL- Orders- Issued Dated 6-06-2020. Available at: https://goir.ap.gov.in/

4. Application of above Steps of Methodology in Select Project State(s) – Andhra Pradesh

We had followed above described rationale for categorization of budget line expenditure for assessing the climate responsiveness of power sector. We found through summation of category wise expenditure that expenditure towards promotion of renewable energy under Major head 2810(for functions related to renewable energy) has zero allocation after 2017-18 (See Table 1). This might be due to discontinuation of schemes

Figure A2 and A3: Andhra Pradesh power sector budget expenditure responsiveness towards climate change mitigation

Figure 11: Amount under various categories (Rs crore)

	Highly Favourable	Quite Favourable	Neutral	Unfavourable	Total
2017-18 A	317.4	382.2	36.4	3,300.0	4,035.9
2018-19 A	65.7	829.5	42.7	1,250.0	2,187.9
2019-20 A	3.6	6,676.6	93.6	4,919.8	11,693.7
2020-21 RE	4,047.9	2,034.3	94.0	0.0	6,176.1
2021-22 BE	4,532.5	1,914.5	190.2	0.0	6,637.2

Figure 12: Various categories' share in total expenditure (%)

	Highly Favourable	Quite Favourable	Neutral	Unfavourable	Total
2017-18 A	7.9	9.5	0.9	81.8	100.0
2018-19 A	3.0	37.9	2.0	57.1	100.0
2019-20 A	0.0	57.1	0.8	42.1	100.0
2020-21 RE	65.5	32.9	1.5	0.0	100.0
2021-22 BE	68.3	28.8	2.9	0.0	100.0

Source: CBGA analysis Of Andhra Pradesh Budget and Detailed Demand for Grants for Energy Department, Andhra Pradesh

Figure A4: Percentage share of different interventions/schemes within the "Highly Favourable" category

% Share of different interventions within Highly Favourable Category

	2017-18 A	2018-19 A	2019-20 A	2020-21 RE	2021-22 BE
Renewable Energy Scheme (Major Head 2810)	23.3	0.0	0.0	0.0	0.0
Hydro Power	1.4	5.0	100.0	0.0	0.1
Y.S.R. Nine Hour Free Power Subsidy(Solar Based)	0.0	0.0	0.0	99.8	99.3
Green Energy Corridor, Assistance to PSUs for- APSEEDCO for Energy Efficiency , APGECo (AP Green Energy Corporation)	75.3	95.0	0.0	0.2	0.6

Source: CBGA analysis Of Andhra Pradesh Budget and Detailed Demand for Grants for Department of Energy, Andhra Pradesh

or may be due to transfer of schemes to the state owned enterprise meant for RE promotion that is , New and Renewable Energy Development Corporation Limited(NREDCAP). In case, these schemes pertaining to Renewable Energy have been discontinued from budgetary support after 2018-19, then AP government need to set forth priorities towards it. Table 1 and 2 provides category wise budget expenditure (sub – total) for expenditure under different climate change mitigation responsiveness categories by power department of Government of Andhra Pradesh and their respective percentage share. Largest share in budget expenditure is categorised as "highly favourable" category in 2020-21 and 2021-22. This is due to shift in government commitment to supply solar-based power supply to agriculture farmers instead of free conventional power supply earlier under YSR none hour free supply scheme.[2]

2 Andhra Pradesh Government Order No. MS-18 dated 15-06-2020, Abstract Providing nine hours day time free power supply to the Agricultural Sector on a sustainable basis - Establishment of 10,000 MW's of Solar Power Projects- Approval of Proposals of APGECL- Orders- Issued Dated 6-06-2020. Available at: https://goir.ap.gov.in/

Andhra Pradesh's Policy and Budgetary Priorities for Transitioning towards Green Economic Recovery

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About the Project:

Building Knowledge and Capacity for Green Economic Recovery of the States in India

The project is meant to build knowledge and capacity for facilitating the green recovery of the State economies in India, following the sharp economic downturn due to the COVID-19 pandemic. The research will help in develop knowledge resources and recommendations that State Government actors could refer to for incorporating climate mitigation actions under their economic revival measures.

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