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Date: October 16, 2022

Subject: Brownfields Siting of Renewable Energy

Executive Summary

Brownfield Siting of Renewable Energy (BSRE) driven by the **Inflation Reduction Act 2022 (IRA)** is one of the most crucial aspects in achieving the goal of 100% clean electricity by 2035 and net-zero GHG emission by 2050.

What is a brownfield?: Brownfield is an abandoned or underused property where redevelopment is complicated by the presence or potential presence of contamination. The GAO estimates that there are as many as **425,000 brownfields** throughout the U.S. Estimated at 5 million acres or roughly the same amount of land occupied by 60 of the largest US cities.

Estimated capacity**: ~800 GW** is the estimated maximum capacity available from BSRE. Decarbonizing the entire energy system would require as much as **3,000 GW by 2050** due to increased electrification in the transportation, buildings, and industrial sectors. BSRE can contribute **~26%** to the total energy ecosystem.

Capacity from BSRE will keep on increasing with time. As more traditional industries retire, the contribution of BSRE to the total clean energy ecosystem will go up. **IRA pledges $128 billion** for renewable energy and grid energy storage, which can be directed toward the development of BSREs.

Recommendations :

A) Recommendations for BSRE in the following regions on priority to ensure **environmental justice**:

1. Areas with high coal-based electricity generation plants (operational)
2. Areas with high PM2.5, air toxins, and hazardous waste proximity
3. Areas with the high unemployment rates, linguistically isolated, people of color among other disadvantaged groups e.g. tribals

B) Recommendations for **community engagement and inclusion** in decision-making:

1. Making the community a stakeholder in the success of BSRE - monetary and other incentives
2. Information dissemination in widely spoken first languages in the US, sign language, braille, etc.
3. Educating youth (future citizens) on BSRE and giving them a seat at the table in decision-making process

C) Miscellaneous recommendations:

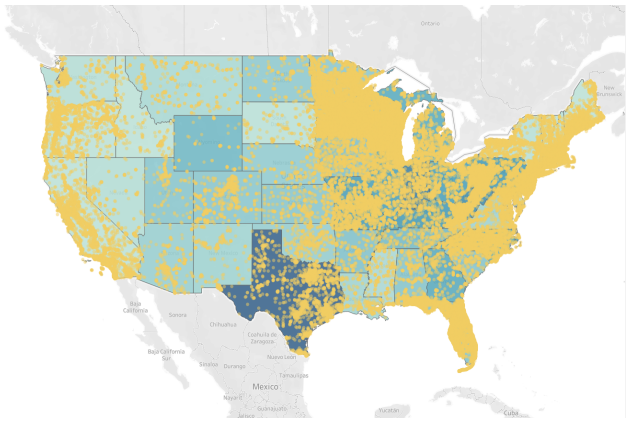
1. Training, and upskilling programs for the workforce involved in coal-based electricity generation to make them employable for local BSRE
2. Creating a **social fund** made up of wide-ranging savings due to BSRE. This fund can be used in various social development sectors like education, healthcare, etc.

Context

For a highly effective and precise action plan, we require more granular data on Brownfields. All the recommendation factors we have considered are based on the current data available. To further improve efficiency, we can formulate a metric to give a weighted average to each factor based on how they affect environmental justice.

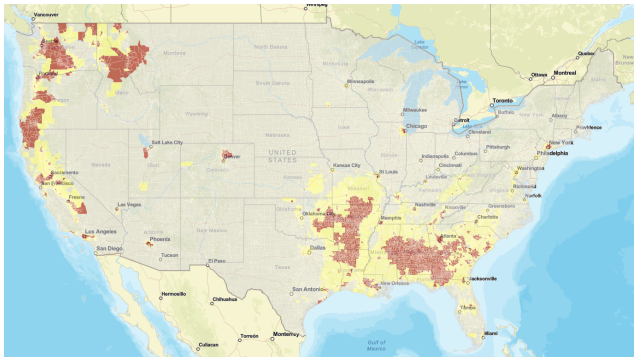
Recommendations

Recommendations for addressing Air Pollution (A.1, A.2):



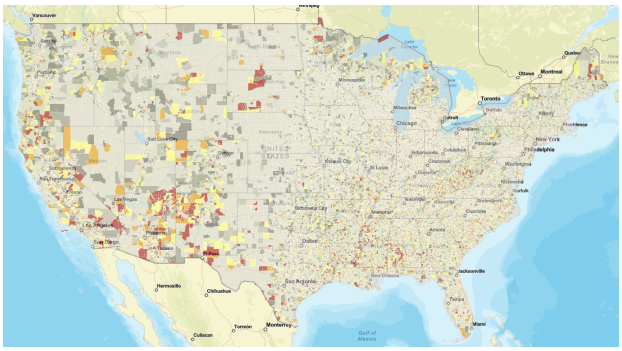
By prioritizing BSREs in the areas with a large number of coal power plants, we can fast-track the goal of decarbonization. Shutting down the coal plants will result in a reduction in PM2.5 and other pollutants. This will help in **addressing air pollution** and adverse health effects like asthma and other **respiratory issues**, saving health expenditure and therefore **more disposable income** in stakeholders' hands. BSREs will clean up existing pollution on brownfields reducing the threats due to proximity to hazardous waste.

Fig. 1: Brownfields (yellow) Vs Operational Coal-based power plants (blue)



BSREs in areas with highly toxic air pollutants will provide energy to electric vehicle (EV) charging stations. Replacing fossil fuel-based vehicles with EVs will result in a **reduction in air pollution**, lessen health threats due to toxic air pollutants and increase life expectancy. Under the IRA, the government has pledged **$13 billion for EV incentives** including a $7,500 tax credit for the purchase of new EVs and providing a $4,000 tax credit for purchasing used EVs.

Fig. 2: Air toxics respiratory hazard index



Prioritizing BSREs in areas with high unemployment rates, linguistically isolated areas, people of color and tribal areas will make the policy **inclusive**. Employment generation and profit sharing from BSREs will **increase income levels** and contribute to the upliftment of **disadvantaged groups**. BSRE development in tribal areas will protect greenfield land (which otherwise would've been used for setting up new clean energy plants). More green cover will reduce wildfire risks for tribal communities.

Fig 2. Unemployment rate

Recommendations for community engagement (B.1):

1. While developing BSREs, we recommend agreements that will give **rent/lease or profit sharing** with the community/local government body. This fund can be used for **community development** e.g. roads, schools, hospitals, parks, etc in the locality.
2. Since communities are now direct stakeholders in the benefits, it will incentivize them to ensure the success of BSREs. We also recommend forming a **citizen watchdog body** to oversee the operations of BSRE to ensure its smooth functioning.

Recommendations for inclusion in the decision-making (B.2, B.3):

1. Dissemination of BSRE awareness and educational information in the most widely spoken languages other than English, sign language, braille, etc. will ensure more inclusiveness in decision making.
2. Setting up elective subjects or educational camps regarding BSREs in institutes along with giving **youth representation** in the decision-making will ensure that the policies remain sustainable
3. Giving local tax benefits to families who actively participate in decision-making. **IRA pledged $270 billion in tax incentives** which can be directed here.

Use of data analytics by govt to facilitate BSRE

1. Governments can use data from successful/failed cases in brownfield to brightfield (B2B) projects to understand what factors worked to make a particular project successful/failure and recreate that in sites with similar environmental and socio-economic factors.
2. Use the **success stories** from B2B projects to encourage communities to involve more in BSREs.
3. Create a **feedback loop system** from previous B2B for understanding BSREs.

Alternatives

Instead of focusing on replacing coal-based electricity with BSREs, which contributes ~22% to total electricity generation in the US, the focus could be on eliminating natural gas-based electricity generation which contributes ~38%. But since **coal is more polluting than natural gas**, (natural gas power plants emit 50-60% less CO2 than coal power plants) replacing coal will be our primary focus.

References

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