RE-energizing the Border

Opportunities for sustainable development through renewable energies in Mexican border states

Study of RE in Mexican border states

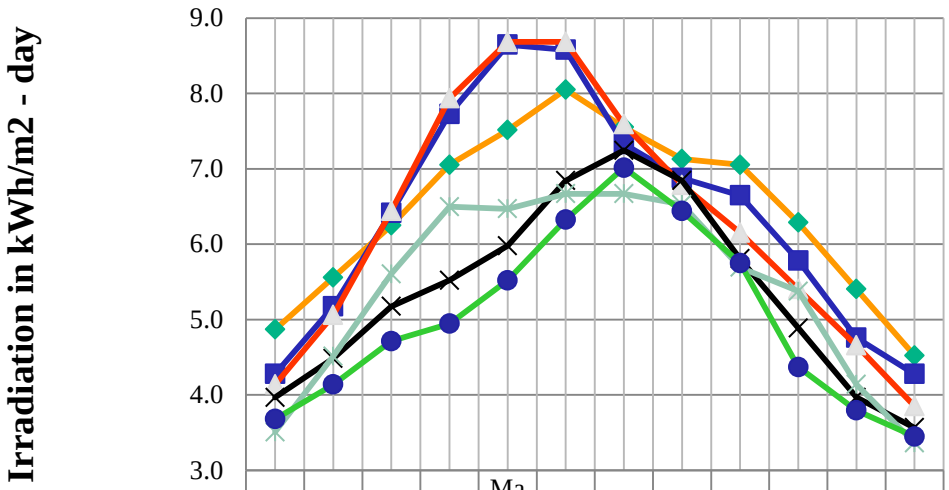
Economic benefits	Knowledge spillover and development of human capital	Social participation
• Direct creation of temporary and permanent jobs • Indirect creation of temporary and permanent jobs – services sectors. • Local and state government energy savings through self-supply projects– benefits passed on to tax payer • Electricity subsidies for local inhabitants. • Electricity supply to off grid communities • Infrastructure investment (roads, water, etc)	• Knowledge and information networks that permeate through multiple social spheres • Specialization in institutes of higher education. • Creation of research and training centers. • Increased interaction between government, business and civil society.	• Communication between government, business and local populations. • Make sure local community becomes stakeholder • Acceptance of projects as driver of local development

Solar power at the border

Mexico has one of the world's top solar resources: the richest area is concentrated on NW border

A 650 km2 of the Sonora desert filled with PV panels would be able to produce enough energy to completely satisfy national electricity demand

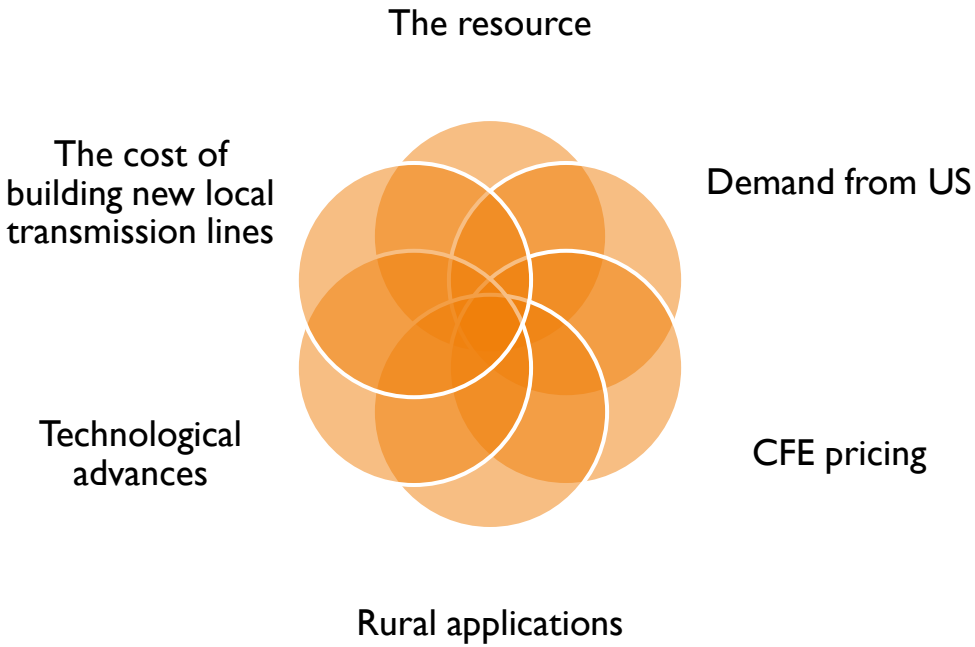
Average monthly irradiation per state in kWh/m2 - day



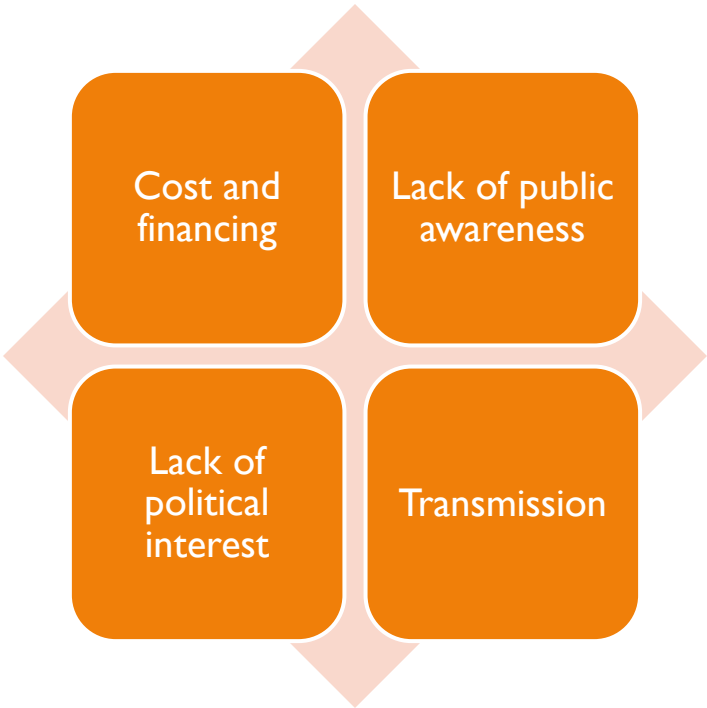
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Baja California	4.9	5.6	6.2	7.1	7.5	8.1	7.6	7.1	7.1	6.3	5.4	4.5
Sonora	4.3	5.2	6.4	7.7	8.6	8.6	7.3	6.9	6.6	5.8	4.8	4.3
Chihuahua	4.1	5.1	6.4	7.9	8.7	8.7	7.6	6.8	6.2	5.4	4.7	3.9
Coahuila	4.0	4.5	5.2	5.5	6.0	6.8	7.2	6.8	5.8	4.9	4.0	3.6
Tamaulipas	3.5	4.5	5.6	6.5	6.5	6.7	6.7	6.5	5.7	5.4	4.1	3.4
Nuevo León	3.7	4.1	4.7	4.9	5.5	6.3	7.0	6.4	5.8	4.4	3.8	3.5

Solar development drivers

Opportunities



Obstacles



Bioenergy Potential in Northern Mexico

Municipal Solid Waste (MSW)

- GHG emissions
- Landfill challenges
- Wasted potential

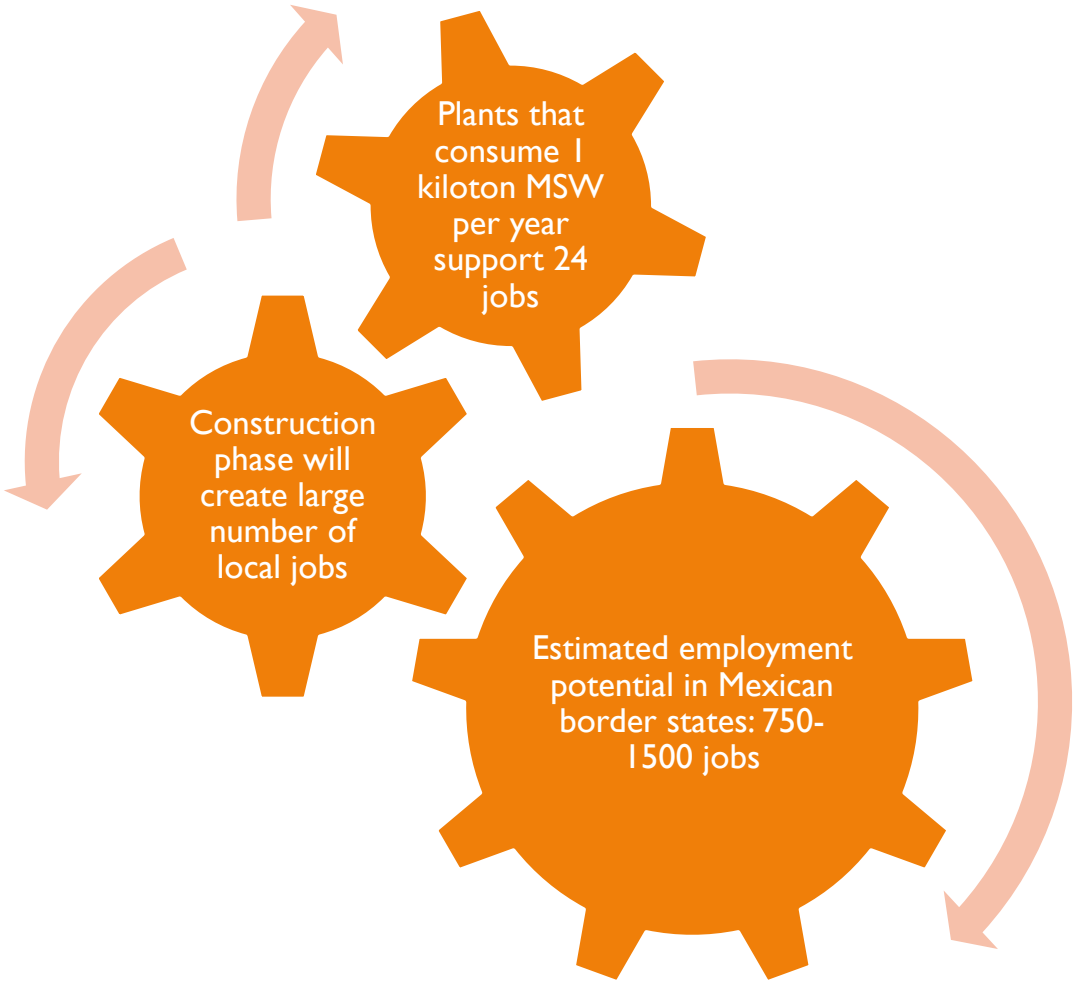
Northern Mexico is an ideal location to center a growing MSW based biofuel industry. First and foremost it has the advantage of cheap land, abundant MSW feedstock and inexpensive labor. Not only is labor cheap but it comes with a significant level of training already in country due to the wide employment footprint of Pemex.

The cities that might have the appropriate characteristics for this type of situation would be Monterrey, Torreon, Juarez, Tijuana and, to a lesser extent, Chihuahua. All of these cities boast over five hundred thousand inhabitants making them large and complex enough to be able to potentially host a MSW biofuel facility and utilize much of its fuel output.

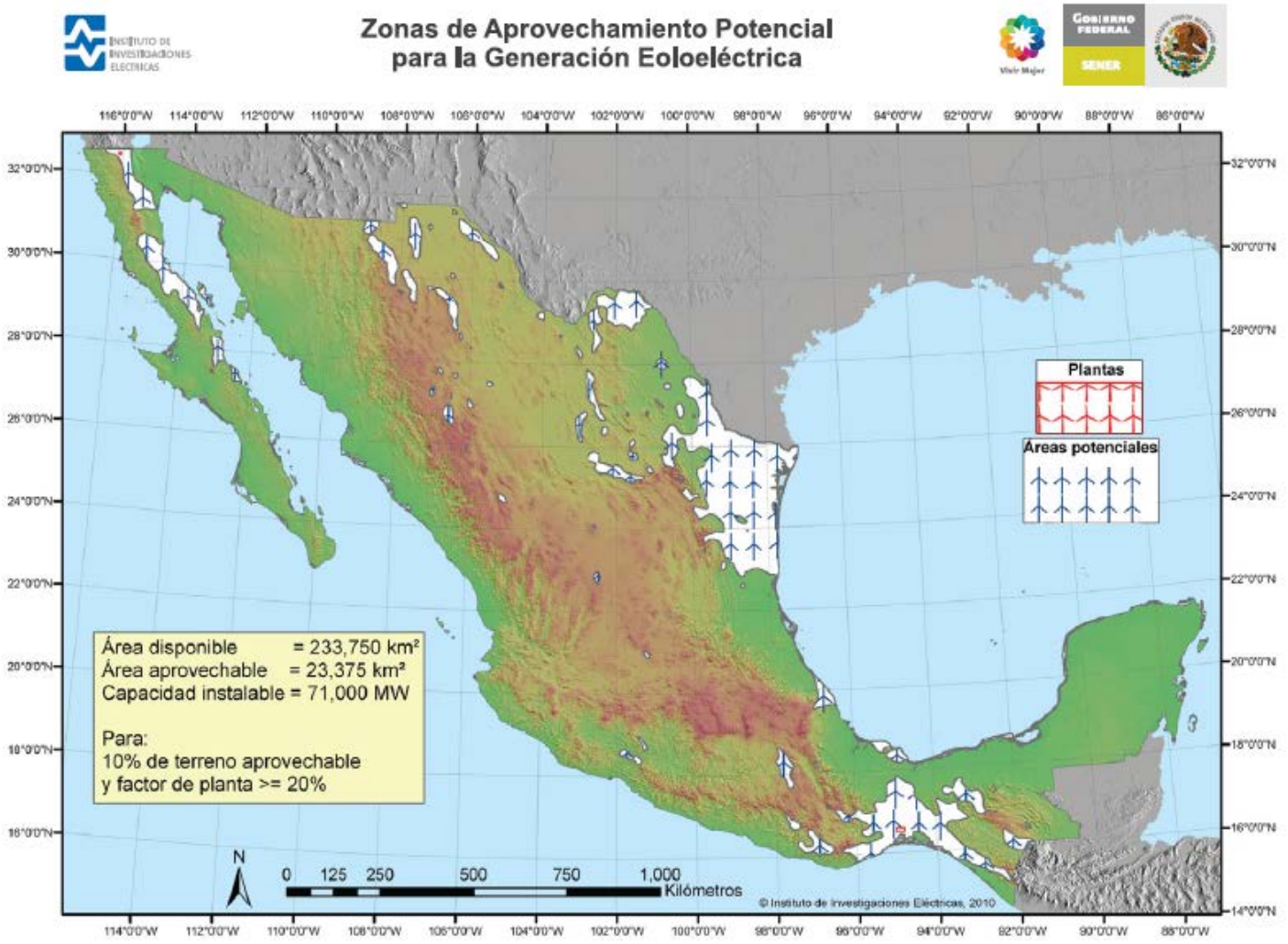
Monterrey biogas project

- Bioenergia de Nuevo Leon
- Electricity from methane for municipal lighting– 12 MW
- 10% cheaper than CFE
- Savings for municipal govt - 50,000 pesos monthly since 2003
- Mitigation of 800,000 t CO2e since 2003

Job creation potential from biogas projects



Wind resource at the border



Tamaulipas

Los Vergeles, San Fernando (2012)

- 161 MW
- Financing: US$ 328 million
- Employment: 500 jobs in construction phase (2 yrs) plus 60 permanent jobs
- 25% reduction in GG
- Low cost electricity for municipal authorities(5-10% savings) – used for hospitals, schools, public lighting, public buildings.

El Porvenir wind park, Reynosa, (2013)

- 54 MW, 156.4 GWh/yr. (72 MW in 2nd stage)
- Financing: US$51 million
- 15 yr self-supply contracts
- According to the COCEF, El Porvenir will reduce carbon emissions by 0,976 metric tons of CO2 in first year
- 20 km of new roads will be built to service the wind park
- Construction will begin in March 2012, come into operation in March 2013.

Wind turbine manufacturing (Matamoros)

- CS Wind Corporation, investing US$60 million in production plant
- For export to the U.S. market
- 700 new jobs in the next 4 yrs: skilled labor - engineers and technicians

Baja California

La Rumorosa I

- 10 MW project - US$27 million
- Employment – 3 permanent, 500 construction jobs 6 months (7 engineers, 25 white collar)
- Electricity for public lighting in Mexicali (80%) - savings (5-10%) for the municipality.
- Subsidy of up to 50% for 35,000 families on CFE bills - Gender and social justice dimensions
- Training Center

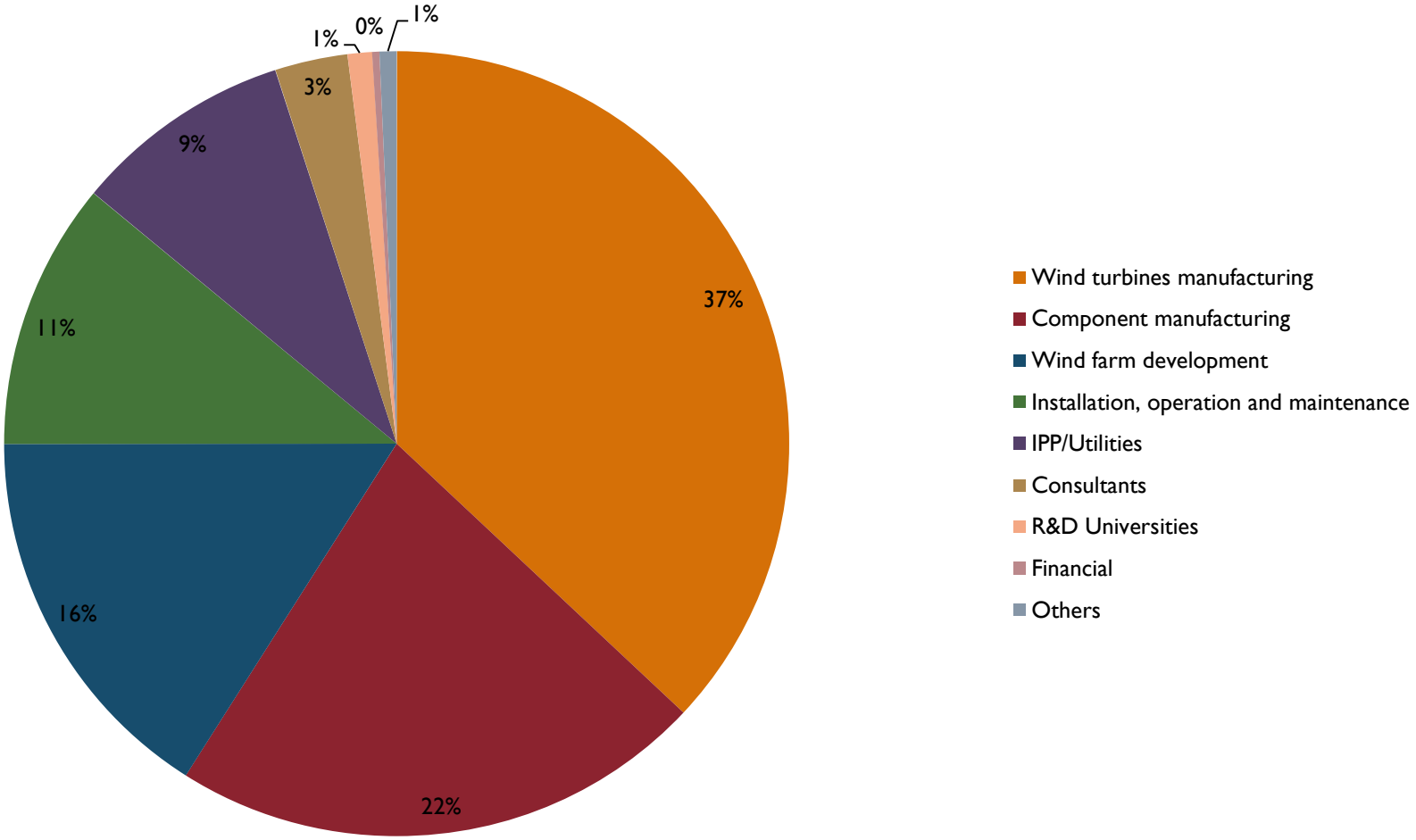
The Future:

- 2.5 - 5 GW potential
- Exports of clean energy to California (RPS)
- US$1 million in rents from 72MW Mexico Wind Services project (Clipper)
- Sempra – 1000-1200MW project for cross border delivery

Obstacles:

- Financing
- Subsidies
- Transmission – local & transborder
- Social dimensions: how to guarantee "fair play" by private sector - lessons from Oaxaca
- Stagnation in bilateral cooperation agenda

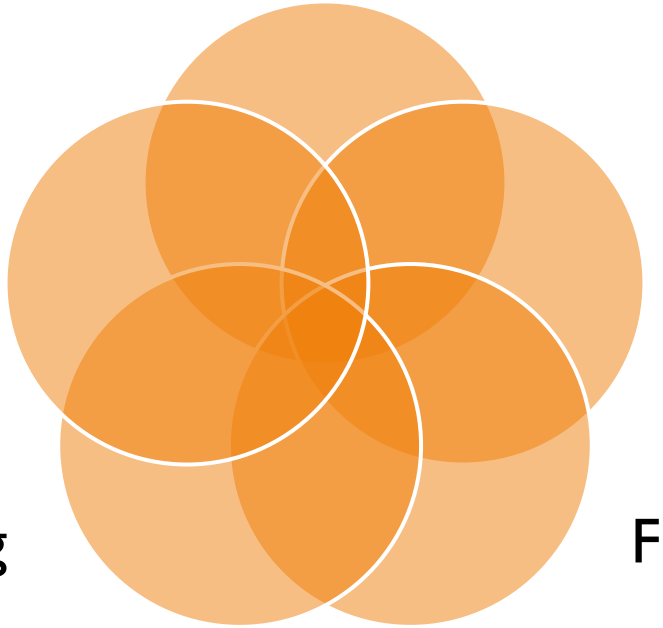
Employment from wind energy



Challenges/opportunities

Transmission – the bilateral task force

The election of July 2012

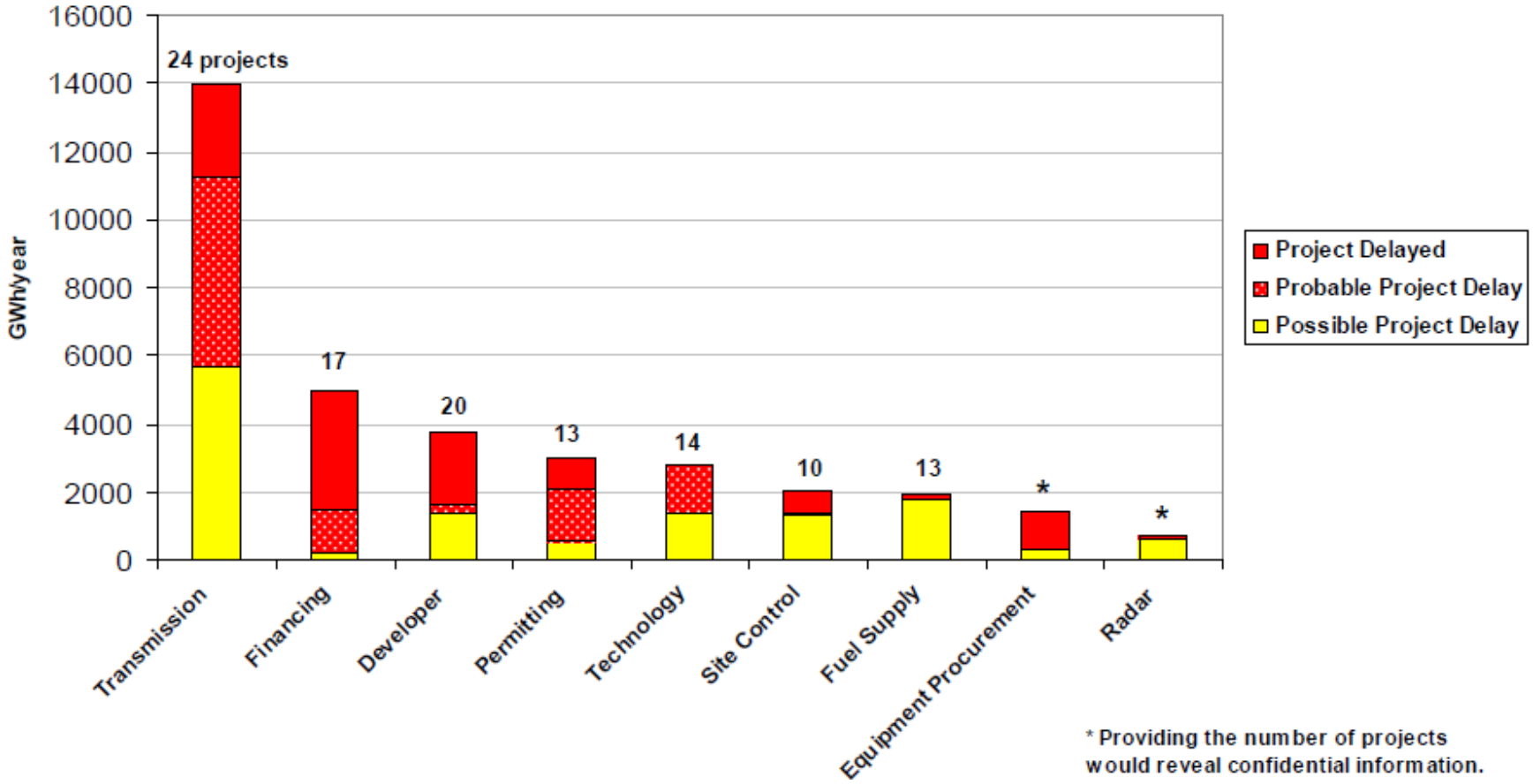


Wind turbine manufacturing

Empowering the states & municipalities

Financing and targets for solar

Barriers to wind projects



Next steps

Reactivate and move forward with bilateral talks

- Bring in the states

Engage with Mexican border governors – the problems of the BGC

- Overcome political "myopia" on both sides

Deal with transmission financing

- Public-private mix

Thank you!

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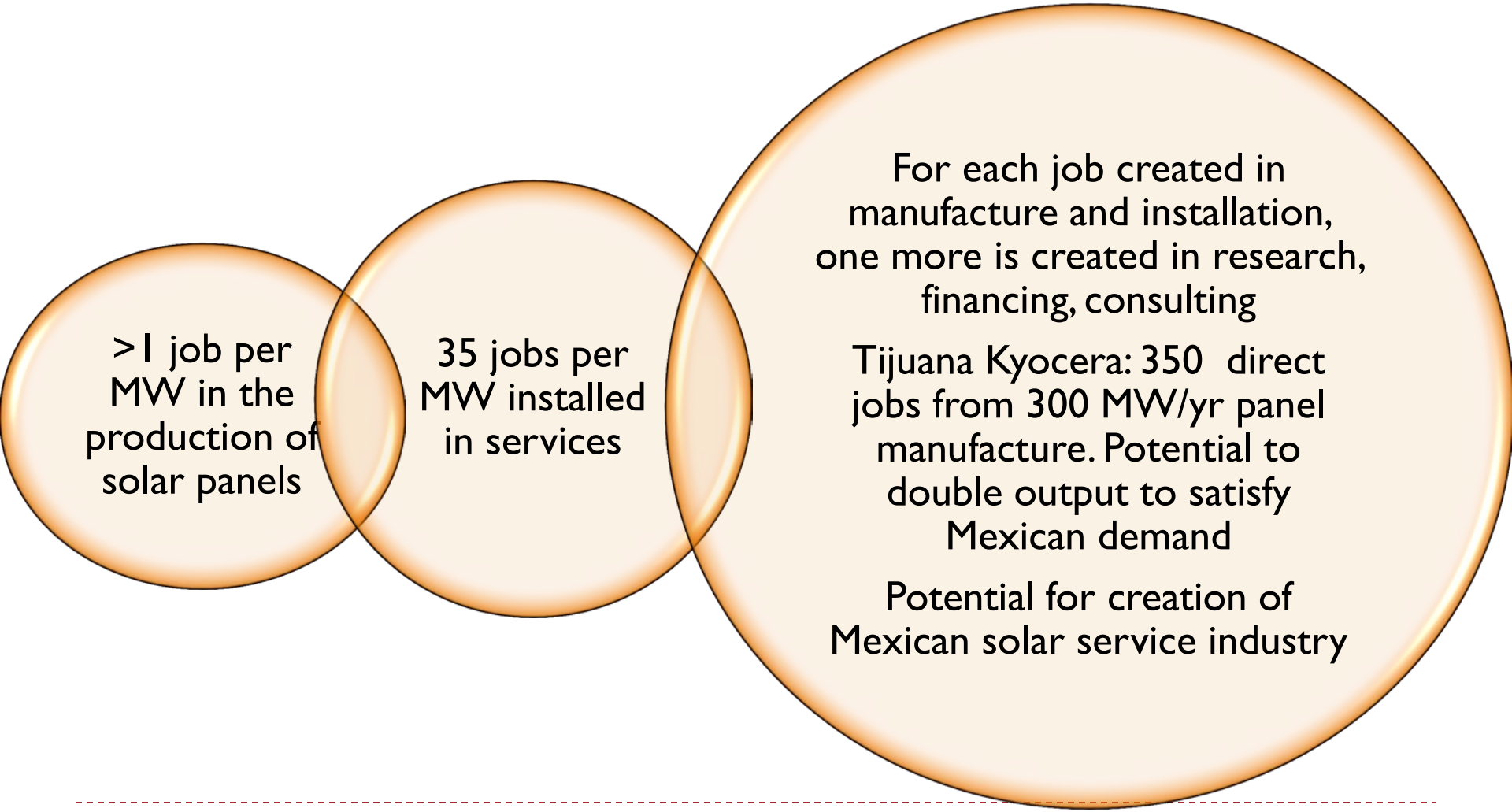
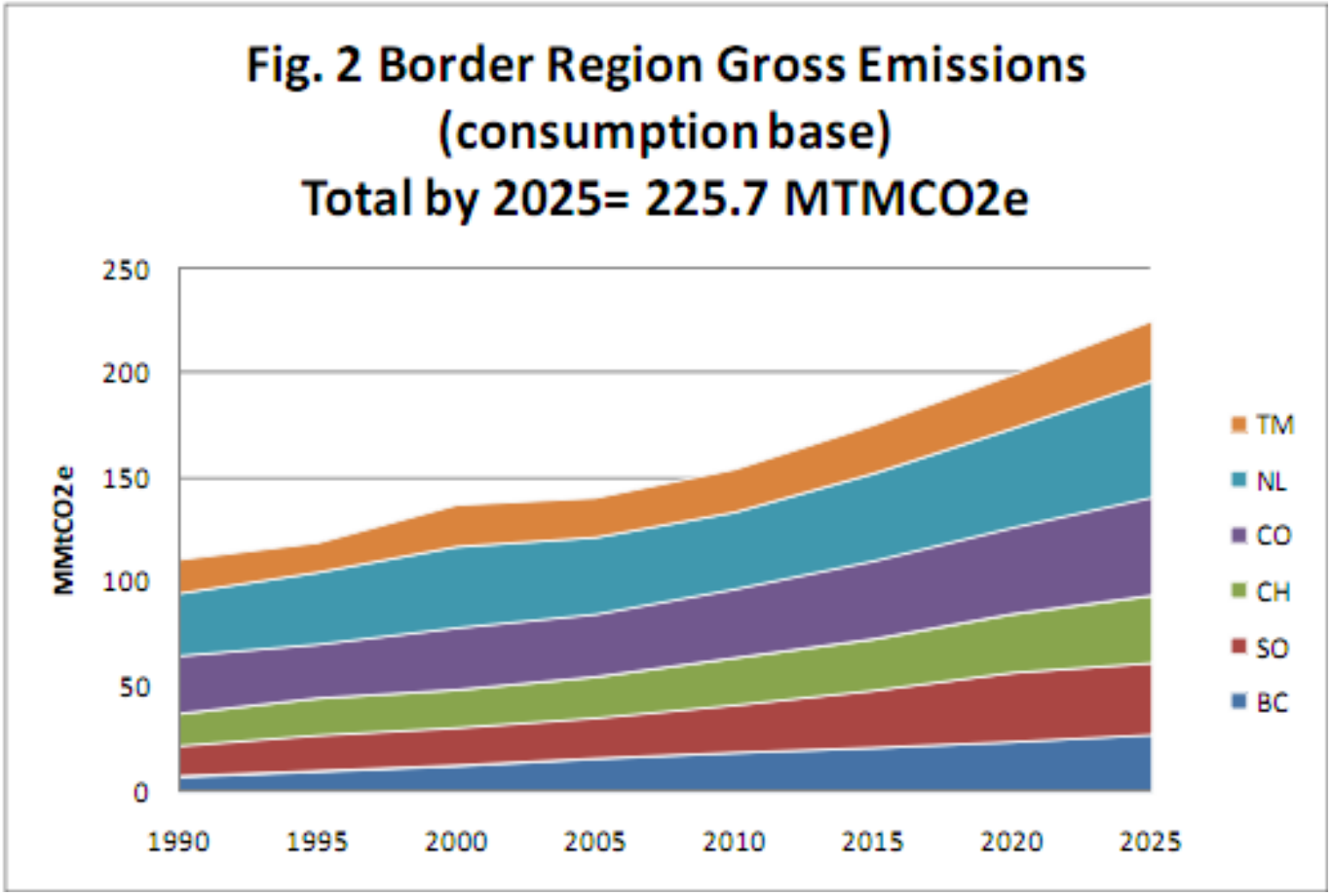
Solar sector employment



Mexican border states GG Emissions (COCEF study)



Benefits of biogas

Beneficio del tratamiento de desechos

- Proceso natural de tratamiento de residuos
- Requiere de menor superficie de terreno que la composta aeróbia
- Reduce el volumen y peso de residuos alojados en rellenos sanitarios

Beneficios energéticos

- Proceso de producción de eneregía neto
- Se genera combustible renovable de alta calidad
- El biogás se ha probado en numerosas aplicaciones de uso final

Beneficios ambientales

- Reduce significativamente las emisiones de GEI
- Elimina olores
- Produce una composta sanitizada y fertilizantes líquidos ricos en nutrientes
- Maximiza los beneficios de reciclado

Beneficios económicos

- Considerando todo el ciclo de vida, es más costoefectivo que otras opciones de tratamiento

Mexico's potential in biogas development

"the infrastructure for collection of municipal solid waste (MSW) is already in place and paid for, and those who collect and dispose of it get paid for their services. This results in very low cost and low risk, making MSW a no-brainer feedstock for launching the cellulosic biofuels industry." Bransby, David. "The Garbage Anomaly." *Biofuels Digest*. 24 Nov. 2011. Web. 08 Dec. 2011.

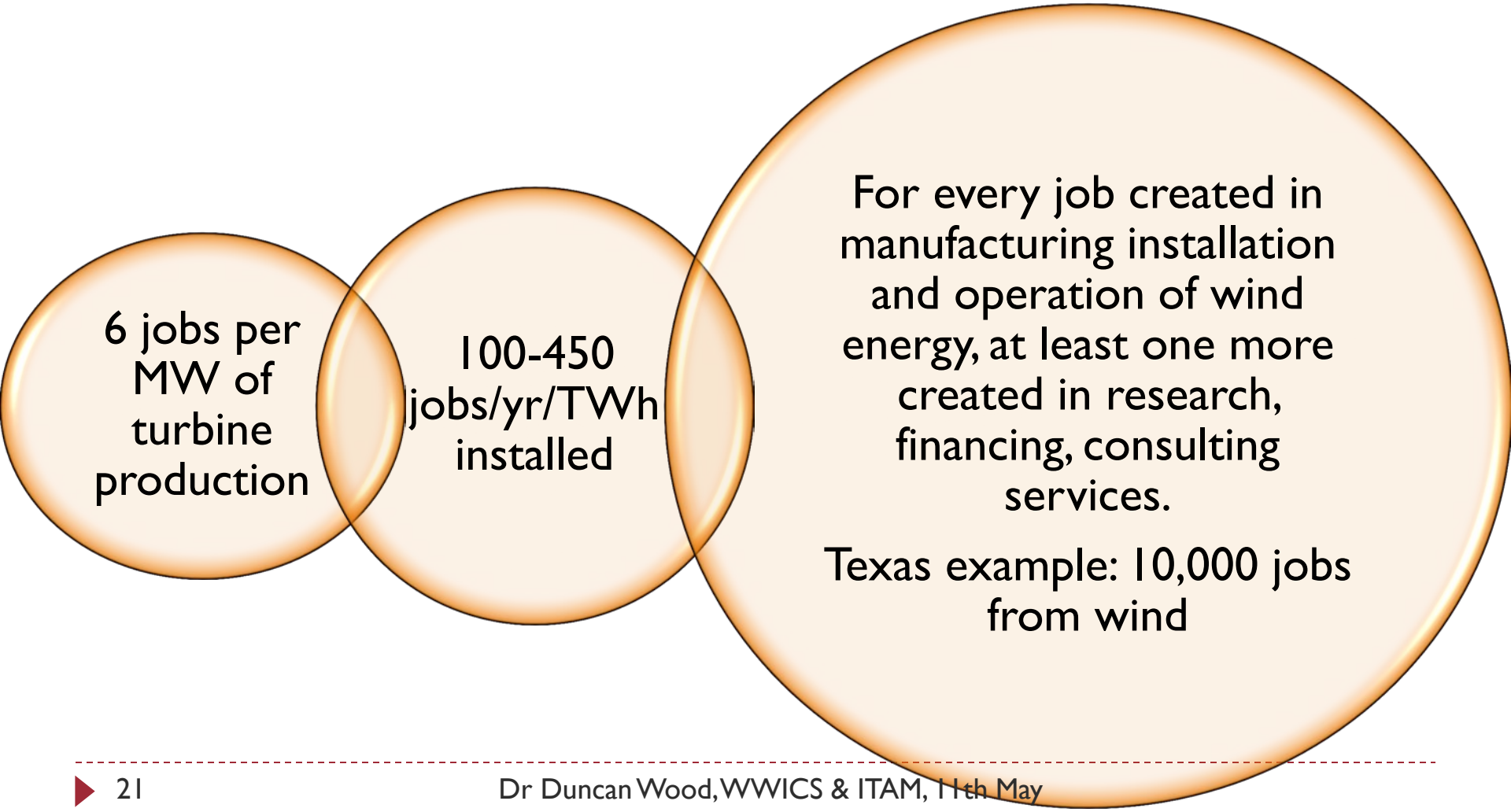
Bioenergy as derived from MSW feedstock which is readily available in volume has the potential to become a fundamental piece in this RE system, thereby contributing to energy diversification strategies as well as reducing greenhouse gas (GHG) emissions and creating new jobs in rural areas along the border region.

Wind projects under development across the border

Proyectos Eólicos Potenciales					
Proyecto[27]	Desarrollador	Región	Modalidad	MW	Fecha estimada de entrada en operación
Fuerza Eólica de Baja California	Fuerza Eólica	Baja Califorina	Exportación	300.0	ND
Mexico Wind	Unión Fenosa/Geobat	Baja California	Exportación	500.0	ND
ND	Cannon Power	Baja California	Exportación	200.0	ND
Baja Wind	Sempra Energy	Baja California	Exportación	250.0	2011
Baja California	Fuerza Eólica	Baja California	Autoabasto	10.0	ND
ND	Gobierno del Estado	Baja California	Autoabasto	10.0	ND
Los Vergeles	SEER	Tamaulipas	Autoabasto	160.0	2010
Eólica Santa Catarina	Econergy	Nuevo León	Autoabasto	20.0	ND

New projects being developed in Chihuahua, Coahuila, Nuevo Leon & Tamaulipas
Potential for manufacturing

Wind energy employment



Biogas potential from MSW in border states

MSW Feedstock Potential in Border Region							
State	Population	KG Generated	MT MSW Daily	MT MSW Annually	120 GL per MT	70 GL per MT	40 GL per MT
Nuevo León	4,653,458	2024254.23	2024.254	738852.71	88662325.2	51719689.7	29554108.4
Chihuahua	3,406,465	1481812.275	1481.812	540861.38	64903365.6	37860296.6	21634455.2
Tamaulipas	3,268,554	1421820.99	1421.82	518964.3	62275716	36327501	20758572
Baja California	3,155,070	1372455.45	1372.455	500946.075	60113529	35066225.25	20037843
Coahuila	2,748,391	1195550.085	1195.55	436375.75	52365090	30546302.5	17455030
Sonora	2,662,480	1158178.8	1158.178	422734.97	50728196.4	29591447.9	2029127856
TOTALS	19,894,418	8654071.83	5257.36	3158735.185	379048222.2	221111463	2138567865